

# A MONOGRAPH OF THE GENUS *PARMELIA* IN NORTH AMERICA, NORTH OF MEXICO<sup>1</sup>

EDWARD CAIN BERRY

*Formerly Graduate Student in the Shaw School of Botany of Washington University*

## INTRODUCTION

This study has been conducted with the purpose of bringing about an orderly arrangement of the species of *Parmelia* and to clarify the literature of the genus for North America, north of Mexico. During this investigation, all obtainable types were studied. Where types have been lacking, original descriptions and illustrations have been studied and compared with exsiccatae and collections from the type localities for the purpose of correlating the description of those species with the material at hand. To prevent confusion, in the literature of the genus Zahlbruckner's arrangement of the species in Engler and Prantl (*Nat. Pflanzenfam.* ed. 2, 8: 233. 1926) has been followed, except where the monographer believes that Zahlbruckner is in error.

## HISTORY

The genus *Parmelia* was established by Acharius in 1803, to supersede *Imbricaria* Acharius (1794). *Imbricaria* was used by various workers to designate the genus until 1930, when *Parmelia* Acharius was placed provisionally in *nomina generica conservanda*, and *Imbricaria* Acharius in *nomina rejicienda* (*International Rules of Botanical Nomenclature*, suppl. *nomina generica conservanda proposita*. 127. 1930). In Acharius' treatments subsequent to 1803 (*Lichenographia Universalis*. 1810; and *Synopsis Methodica Lichenum*. 1814), he removed considerable portions of the genus as first considered. Of the species which he retained in this last treatment, most remain in the genus as it is understood to-day.

<sup>1</sup> An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University and submitted as a thesis in partial fulfillment of the requirements for the degree of Doctor of Philosophy.



Dodge and Baker also agree that the type should be selected from this group (Second Byrd Antarctic Expedition—Botany. Lichens and Lichen Parasites. Ann. Mo. Bot. Gard. **25**: 589. 1938). This would conform with the present rules of Botanical Nomenclature since it would exclude the doubtful species and those which other workers have placed in related genera. The author feels that *Lichen saxatilis* Linn. meets all the requirements recommended for the selection of the type, it being a species with which Acharius was thoroughly familiar and at the same time one species which was universally recognized by early writers as a member of the genus *Parmelia*. Consequently, in this monograph, the type of the genus *Parmelia* is designated as *Parmelia saxatilis* (L.) Ach., Meth. Lich. 204–205. 1803. The description of the plant is given on page 82.

#### ECOLOGY

The area considered in this monograph includes continental North America, the immediately adjoining islands north of the international boundary of Mexico, and the islands of the Gulf of Mexico. This area represents a variety of habitats. The elevation varies from sea level to 4419.5 m.; the rainfall from less than 12.5 cm. to more than 508 cm. annually; the average annual temperature from 24° to 25° C., the temperature range from –45° to more than 56° C.

The lichens growing on the peaks of the higher mountains may be considered as occupying an arctic environment, the plants from the southern end of Florida and the mouth of the Mississippi as tropical in their affinities and climatic conditions. All of the species of *Parmelia* found in the area defined will be considered in this monograph regardless of their affinities or environmental conditions.

Species of *Parmelia* are found on rocks, bark of trees, fenceposts, buildings, fallen branches, logs, and rarely on the ground. Lichen growth is influenced by the environmental factors of water supply, substratum, wind, smoke, and temperature. Some species are tolerant to many environmental conditions and have a wide distribution; others, which have a very



limited tolerance to one or more of the environmental factors, are consequently more restricted.

*Parmelia conspersa*, *P. caperata*, *P. centrifuga* and *P. lineola* require full sunlight, growing on rocks, the upper branches of trees, and on buildings. These species are never seen in vigorous condition in shade or in subdued light. *Parmelia lineola* is found in the West and Southwest, covering the tops of rocks where they are exposed to the intense light of the desert sun.

*Parmelia olivacea* and its variety *aspidota* grow in shaded situations, the full light of the sun inhibiting their growth.

Another group which requires some direct sunlight but is seldom found in full light consists of *Parmelia rudecta*, *P. Borreri*, *P. cubensis*, and *P. erecta*. These lichens are found growing in positions where the full light of the sun falls on them for only a portion of the day.

The moisture requirement of the different species is very variable. *Parmelia lophyrea* is endemic only in the region of the Northwest where the moist wind of the Pacific Ocean comes in contact with the foothills of the mountains, while *P. lineola* is found in the desert section of the continent. *Parmelia enteromorpha* prefers a cool moist habitat, but also shows tolerance for desert conditions. The species attains its greatest size and abundance in the redwood section of northern California, but is also found in reduced size and numbers in the deserts of southern California.

The distribution of a number of species indicates a definite temperature limitation. *Parmelia Cladonia* is limited to the northeastern portion of the United States and the higher elevations of the Appalachian Highlands. It is common in the White Mountains of New Hampshire and continues south in the mountains at high elevation. The southernmost collection is from Clingmans Dome, Tennessee-North Carolina, an elevation of 6600 feet. *Parmelia physodes* is a common lichen in the timbered section of Canada, northern United States, and in the higher mountains to the south. In the lowlands, it extends south to Florida and Texas, gradually decreasing both in the number of individuals and in size. *Parmelia latissima*,



*P. tinctoria* and *P. livida* are abundant in Central America and Cuba. They grow also in the southern part of the United States, but never in localities where severe freezing occurs. *Parmelia caperata* and *P. Borreri* are found in all parts of the area studied, with little change in appearance. Smoke is always harmful to the species of *Parmelia*, and in any considerable concentration will destroy the plants entirely.<sup>2</sup>

#### MORPHOLOGY

*Parmelia* is leaf-like in form, growing above the surface of the substratum. It is composed of an upper cortex, an algal layer, medulla, and lower cortex. The cortex, sometimes referred to as a plectenchyma, is formed of small septate vertical hyphae which are woven into a firm layer. The distance between the septae is about equal to the diameter of the hyphae, giving the cortex the appearance of being formed of small isodiametric cells. The hyphae are separated by secretions which form a matrix characteristic of the species.

*Cortex*.—The thickness of the cortex in a species is characteristic, but it may be modified by age or environment. Old plants of some species in exposed situations may lose the entire upper cortex, in which case the whole upper surface becomes sorediose. In the younger portions of the thallus, the upper and lower cortex are essentially the same in thickness. Either the upper or lower cortex is often broken by cracks which permit the exchange of gases with the gonidial and medullary hyphae. In those species which have the margin of the thallus raised, as in *P. perforata* and *P. erecta*, the lower cortex is subject to the same factors of weathering as the upper cortex. The exposed portion of the lower cortex is approximately of the same thickness as that of the upper, while farther from the margin it is definitely thicker. The structure of the lower cortex is the same as that of the upper, except that from its surface either rhizinae or a cushion-like mass of hyphae arise. The outer layer of hyphal cells and the rhizoids are usually heavily

<sup>2</sup> Haugsjå, Pål K. Über den Einfluss der Stadt Olso auf die Flechtenvegetation der Bäume. *Nyt Mag. Naturv.* 68: 1-118. 1930.



inflated with a dark brown or black pigment. A detailed study of the thickness of the thallus in 72 collections of *P. rudecta* shows that it varies from 400 to 810  $\mu$ , with an average thickness of 638  $\mu$ . The thickness of the upper cortex varies from 18 to 23  $\mu$ , with an average of 20  $\mu$ . The lower cortex varies from 65 to 84  $\mu$ , with an average of 73  $\mu$ . The variation of the algal layer is from 42 to 45  $\mu$ , with an average of 44  $\mu$ . The thickness of the medullary layer varies from 262 to 667  $\mu$ , with an average of 502  $\mu$ .

Isidia are coralloid branchlets and granules on the upper surface of such species as *P. caperata*, *P. Borreri*, *P. crinita*, and they are constant characters. They are the result of a continued growth upward of the vertical hyphae of the cortex. Some of the algal cells from the gonidia are carried up with the growing hyphae, and a gonidial layer is formed in these structures. Such outgrowths increase the photosynthetic area of the plant and also furnish an important means of vegetative reproduction. They contain all of the essential vegetative parts of the lichen body, and are easily broken off. They can be carried by wind, gravity, or by water to new locations, where they may produce new thalli.

Soredia are constant structures on some species of *Parmelia*, but never found on others. They are uncovered masses of hyphae which contain algal cells, and they may take the form of small round dots, as in *P. rudecta*, or confluent globular masses along the margins of the thallus, as in *P. cristifera*.

Soredia arise from the gonidial layer of the thallus and reach the surface by the breaking, cracking, or loss of the cortex. The medullary hyphae absorb large quantities of water, and the imbibitional swelling causes them to exert pressure on the cortex when the plant is thoroughly wet, particularly after having been dried. The pressure of the medulla pushes the gonidial layer into the break and a soredium is formed. When the weakened portions of the cortex assume definite lines, the soredia are formed in a distinct pattern of reticulate ridges, as is seen in *P. sulcata*. In those species with definite marginal soredia, as *P. physodes* and *P. cristifera*, the upper and lower cortex are weakly joined together and the soredia are formed



by cracks at this line. The number and size of the soredia are determined by the extent of the weakness of the cortex and the amount of the swelling of the medullary hyphae. When the cortex is broken and the algae are placed in a position to secure more carbon dioxide, the rate of photosynthesis increases. Thus the food supply to the gonidial hyphae becomes greater and more rapid growth is produced. The soredia, being unprotected, are easily detached from the thallus by wind or rain. They thus serve as an important method of vegetative reproduction for those species in which they occur.

*Gonidia*.—The gonidial layer consists of algal cells (species of *Protococcus*) enmeshed in a tangle of thin-walled hyaline hyphae. The algae may form a continuous layer with the hyphae, or the layer may be lobed or even broken in spherical masses of hyphal and algal cells. The hyphae usually partly surround the algal cells with disk-like appressoria, though in many instances it is possible to see haustoria penetrating the cell walls of the algae. The algae of the gonidial layer supply the elaborated food for the fungus of the lichen.

*Medulla*.—The medullary layer consists of a loosely woven web of septate hyphae running parallel to the surface of the thallus. The hyphae are thick-walled and usually hyaline or very brown or yellowish. In a few species, *P. pertusa*, *P. physodes* and *P. olivacea*, some medullary hyphae are extremely large and dark brown or black. The medulla serves the purpose of holding the thallus together and providing a means of moving the nutritive materials in the plant. In species where the inflation of the thallus occurs, there is a separation of the hyphae of the medulla. The medullary hyphae are usually heavily impregnated with the lichen acids, as is shown by the reactions given with potassium hydroxide and calcium hypochlorite. The color of the medulla when exposed by the removal of the cortex is white or yellow. The loosely interwoven hyphae of the medulla also serve to provide a passage for gases through the thallus of the plant.

*Apothecium*.—The apothecium of *Parmelia* consists of an open disk on the upper surface of the thallus. The margin con-



sists of two well-defined layers. The inner layer is a continuation of the hypothecium and is of the same origin, structure, and color. This covering is a continuation of the protective hyphae which formed around the ascocarp when it first began development below the upper cortex. The hypothecium never contains any algal cells. The algae in the gonidial layer below the hypothecium are continuous with those in the thallus, and are always present except in those species in which the apothecium is perforated. The perforations of the apothecium arise from the death of the algal cells. In turn the hyphal cells die from lack of food supply and drop out, leaving a hole in the apothecium and thallus below. The perforation of the apothecium may appear occasionally in any species, but in certain species this is constant enough to provide a secondary diagnostic character. The apothecium may be sessile, attached directly to the thallus by the under-side, or it may be short-stipitate, the short stalk raising the fructification slightly above the surface of the thallus.

The amphithecium or outer protective layer surrounding the apothecium is similar in general appearance to the thallus, and is thalloid in origin. The hyphae forming it are a direct continuation of those of the thallus, but the variation in thickness is much less than in the thallus. The gonidia are continuous with the thalloid gonidia. The disk of the ascocarp is located just above the sub-apothecial gonidial layer and consists of a sterile base (the hypothecium) which is composed of small, closely woven, hyaline or light brown, septate hyphae. Immediately above the hypothecium lies the thecium, composed of the ascogenous hyphae, and asci, with the ascospores and the sterile paraphyses imbedded in a gell.

The asci are clavate, and usually contain eight ellipsoid ascospores. In a few species the number of spores may be two or four, as in *P. pertusa*, or many, as in *P. multispora*. The ascospores are hyaline, non-septate, and usually thin-walled. Occasionally the walls are thick, as in *P. Herreana*.

The paraphyses are septate, sparingly branched, and usually enlarged at the tip. The color of the disk is due to the color of the tips of the paraphyses and the surrounding gelatinous



matrix. In its development the epithecium, or disk covering, is not distinguishable from the open disk. The ascospores mature continuously throughout the existence of the open apothecium. It is common to find both young asci and mature spores in the apothecium of any species.

*Spermagonium*.—The spermagonia appear as black dots on the surface of the thallus or the apothecial margin. The black dot is the spermagonial opening, commonly called the ostiole. The spermagonium is a pyriform or spherical cavity with a black upper wall and a hyaline lower wall. Spermatophores arise from the hyaline portion of the wall and are sparingly branched. The spermatia are simple, straight, or cylindrical with a slight constriction in the middle. They are discharged through the ostiole along with a colorless gelatinous secretion when the thallus is wet. In *Parmelia* they are small and lack sufficient differentiation to be of taxonomic value in the genus.

*Rhizinae*.—The rhizinae arise on the lower surface of the thallus as outgrowths of the hyphae of the lower cortex. They may be lighter, darker, or of the same color as the surface of the lower cortex. They usually consist of numerous thread-like strands, but they may be either papillose or united into compact strands terminating in a mucilaginous disk called a haptorium. The rhizinae serve to attach the lichen to the substratum. There is little reason to believe that they have any considerable importance as organs of absorption or conduction of minerals in solution.

#### CHEMICAL REACTIONS

The color reactions of potassium hydroxide, calcium hypochlorite, and paraphenyldiamin are the result of these reagents on the specific lichen acids. A characteristic color reaction is an indication of the species of a lichen when taken in connection with morphological characters and distribution. A chemical reaction alone is not sufficient to differentiate a species. The technique followed in determining the color reaction was to make several "free hand" sections 40–100  $\mu$  in thickness through the thallus so that both cortices of the lichen



were shown. The sections were placed on a slide and the reaction of the chemical reagent on each part of the thallus was observed through a dissection microscope.

## CHART OF CHEMICAL REACTIONS

Species	KOH	CaOCl <sub>2</sub>	KOH+CaOCl <sub>2</sub>	Paraphenyl- endiamin
<i>olivacea</i> var. <i>aspidota</i>	none	none	none	yellow
<i>Bolliana</i>	none	none	light pink	none
<i>cetrata</i>	none	none	none	none
<i>cetrata</i> var. <i>subisidiosa</i>	none	none	none	none
<i>cirrhata</i>	none	none	none	yellow
<i>sphaerosporella</i>	none	none	none	red-brown
<i>chlorochroa</i>	none	none	brown	yellow
<i>cubensis</i>	none	none	none	yellow
<i>encausta</i>	none	none	none	none
<i>exasperata</i>	none	none	none	none
<i>caperata</i> var. <i>incorrupta</i>	none	none	none	red
<i>Hubrichtii</i>	none	none	none	none
<i>multispora</i>	none	none	none	none
<i>sulphurosa</i>	none	none	none	none
<i>olivacea</i>	none	none	none	yellow
<i>texana</i>	none	none	brown	none
<i>caperata</i> var. <i>subglauca</i>	none	none	none	none
<i>conspersa</i>	yellow	none	none	red-brown
<i>furfuracea</i>	yellow	none	yellow	yellow
<i>tinctoria</i>	yellow	none	none	none
<i>conspersa</i> var. <i>isidiata</i>	yellow	none	none	none
<i>caperata</i>	yellow	none	none	red
<i>centrifuga</i>	yellow	none	yellow	none
<i>crinita</i>	yellow	none	none	none
<i>conspurcata</i>	yellow	none	red	none
<i>endoxantha</i>	yellow	none	yellow	yellow
<i>enteromorpha</i>	yellow	none	yellow	yellow
<i>lophyrea</i>	yellow	none	none	none
<i>leucochlora</i>	yellow	none	none	none
<i>omphalodes</i>	yellow	none	none	none
<i>perforata</i>	yellow	none	pink	none
<i>perforata</i> var. <i>hypotropa</i>	yellow	none	pink	none
<i>pertusa</i>	yellow	none	yellow	none
<i>perlata</i>	yellow	none	none	none
<i>perlata</i> var. <i>ciliata</i>	yellow	none	none	none
<i>physodes</i>	yellow—then red	none	brown	red
<i>proboscidea</i>	yellow	none	none	none
<i>quercina</i>	yellowish	none	none	yellow
<i>sulcata</i>	yellow	none	yellow	red-brown
<i>lineola</i>	yellow	none	none	none
<i>saxatilis</i>	yellow	yellow	yellow	red-brown
<i>saxatilis</i> var. <i>Anzi</i>	yellow	yellow	yellow	red-brown
<i>cetrarioides</i>	yellow	yellow	yellow	red-brown



## CHART OF CHEMICAL REACTIONS (Continued)

Species	KOH	CaOCl <sub>2</sub>	KOH+CaOCl <sub>2</sub>	Paraphenyl- endiamin
<i>erecta</i>	none	yellow	yellow	yellow
<i>livida</i>	none	brown	brown	orange
<i>Herrei</i>	none	brown	none	none
<i>Cladonia</i>	brown	none	brown	yellow
<i>praesignis</i>	brown	none	none	gray
<i>incurva</i>	brown	none	none	none
<i>aurulenta</i>	brown	none	brown	brown
<i>stygia</i>	none	none	none	none
<i>laevigata</i>	brown	none	none	orange
<i>prolixa</i>	brown	none	none	none
<i>sublaevigata</i>	brown	none	none	none
<i>pubescens</i>	brown	none	none	none
<i>caroliniana</i>	brown	yellow	brown	none
<i>cratifera</i>	red	none	brown	red-brown
<i>reticulata</i>	red	none	none	none
<i>Herreana</i>	red	none	red	none
<i>cetrarioides</i> var. <i>rubescens</i>	red-brown	none	none	none
<i>Finkii</i>	none	red	red	none
<i>rudecta</i>	none	red	yellow	gray
<i>soredica</i>	none	red	none	none
<i>olivacea</i> var. <i>glabra</i>	none	red	none	none
<i>Borreri</i>	none	red	none	none
<i>latissima</i>	red	red	none	brick-red

## ABBREVIATIONS

The herbaria from which material has been studied and from which specimens are cited in this monograph are indicated by the following abbreviations:

- BSNH—Boston Society of Natural History, Boston, Mass.  
 BPI—Bureau of Plant Industry, Washington, D. C.  
 D—Private Lichen Herbarium of Dr. C. W. Dodge, St. Louis, Mo.  
 F—Farlow Herbarium, Cambridge, Mass.  
 FM—Field Museum of Natural History, Chicago, Ill.  
 IA—University of Iowa, Iowa City, Ia.  
 M—University of Michigan, Ann Arbor, Mich.  
 MIN—University of Minnesota, St. Paul, Minn.  
 MBG—Missouri Botanical Garden, St. Louis, Mo.



MONT—University of Montana, Missoula, Mont.

NYBG—New York Botanical Garden, New York, N. Y.

LSU—Stanford University, Palo Alto, Calif.

O—University of Ohio, Columbus, Ohio.

R—Russell Herbarium of Buffalo Society of Natural History, Buffalo, N. Y.

T—Tuckerman Herbarium, Harvard University, Cambridge, Mass.

US—United States National Herbarium, Washington, D. C.

W—Wellesley College, Wellesley, Mass.

WIS—University of Wisconsin, Madison, Wis.

### TAXONOMY

***Parmelia*** Acharius, Meth. Lich. 153. 1803; Lichenogr. Univ. 89, 456. 1810; Syn. Meth. Lich. 195. 1814; Rabenh., Prodr. Fl. Neomarch. 299. 1804; Röhl., Deut. Fl. 3, Abt. 2: 18. 1813; Mart., Fl. Crypt. Erlangens, 205. 1817; S. Gray, Nat. Arr. Brit. Pl. 1: 436. 1821; Hook., Fl. Scot. 2: 52. 1821; Fée, Essai Crypt. Ecor. Officin. 121, *pl.* 62. 1824; Fries, Syst. Orb. Veget. pars 1: 241. 1825; Lichenogr. Eur. Reform. 56. 1831; Duby, Bot. Gallic. 2: 600. 1830; Eaton, Man. Bot. N. Amer. ed. 6, 56. 1833; Wallr., Fl. Crypt. German. 3: 442. 1831; Taylor apud Mack., Fl. Hibern. 2: 141. 1836; Rabenh., Deutschl. Krypt. Fl. Rar. 2: 54. 1845; Tuck., Enum. N. Amer. Lich. 49. 1845; De Not., Mem. Accad. Sci. Torino, II. 10: 378. 1849; Schaer., Enum. Crit. Lich. Europ. 33. 1850; Nyl., Mem. Soc. Nat. Cherbourg 3: 174. 1855; Syn. Lich. 1: 375. 1860; Mudd, Man. Brit. Lich. 92. 1861; Müller-Argau, Mem. Soc. Phys. & d'Hist. Nat. Genève 16: 372. 1862; Kickx, Fl. Crypt. Flanders 1: 218. 1867; Th. Fries, Lichenogr. Scand. 1: 111. 1871; Leighton, Lich. Fl. Gt. Brit. 122. 1871; Sydow, Flecht. Deutschl. 32. 1887; Wainio, Étude Lich. Brésil 1: 27. 1890; Crombie, Monogr. Lich. Brit. 1: 232. 1894; Calkins, Lich. Fl. Chicago & Vic. 18. 1896; Oliver, Expos. Lich. Ouest Fr. 1: 107. 1897; Schneid., Textbook Gen. Lichenol. 167. 1897; Zahlbr. apud Engl. & Prantl, Nat. Pflanzenfam. 1 Teil, Abt. 1: 211. 1907, and ed. 2, 8: 233. 1926; Fink, Contrib. U. S. Nat. Herb. 14: 190. 1910; Lich. Fl. U. S. 320. 1935; Herre, Proc. Wash. Acad. Sci. 12: 193. 1910; A. L. Smith, Monogr. Brit. Lich. 1: 118. 1918; Handbook Brit. Lich. 35. 1921; Dodge & Baker, Ann. Mo. Bot. Gard. 25: 589. 1938.



*Imbricaria* Acharius, Kgl. Svenska Vetensk. Akad. Nya Handl. 15: 250. 1794; Michaux, Fl. Bor.-Amer. 322. 1803; DC. apud Lam. & DC., Fl. Fr. ed. 3, 2: 385. 1815; Kickx, Fl. Crypt. Louvain, 72. 1835; Körb, Lich. Germ. Spec. 8. 1846; Krmphbr., Geschichte d. Lich. 2: 49. 1869; Arnold, Lich.-Fl. München. Ber. Bayr. Bot. Gesells. 1: 26. 1891.

*Parmelia* sect. *Lobaria* Sprengel, Fl. Halensis, 332. 1806.

*Physcia* S. Gray, Nat. Arr. Brit. Pl. 1: 455. 1821.

*Parmelia* sect. *Imbricaria* Fries, Syst. Orb. Veget. pars 1: 242. 1825; Tuck., Enum. N. Amer. Lich. 49. 1845; Schaer., Flora 32: 291, 296. 1849.

*Parmelia Lobaria* sect. *Imbricaria* Endlicher, Gen. Pl. 15. 1836.

*Parmelia* sect. *Parmelia* Hooker, Handbook New Zealand Fl. 571. 1867.

*Parmelia* subgen. *Euparmelia* Harmand, Bull. Soc. Sci. Nancy, II. 31: 216. [1896] 1897.

The type of the genus is *Parmelia saxatilis* (L.) Ach., Meth. Lich. 204-205. 1803.

Thallus foliose, appressed or ascending, laciniate, with rounded, linear, or filiform lobes, often imbricate; upper surface often soresiose or isidiose, lower surface either lighter or darker than the upper, usually covered with rhizoids except at the margins; upper and lower cortex of vertical hyphae woven into plectenchyma; rhizinae arising from a fusion of hyphae of the lower cortex; medulla of loosely woven periclinal hyphae; algae *Protococcus*; apothecium on upper surface never marginal, sessile or short-pedicellate, disk concave or flat, chestnut-brown, amphithecium prominent, hypothecium hyaline with algae below; paraphyses imbedded in a gell, usually branched and septate, clavate or pointed at the tips; asci clavate, usually 8-spored, ascospores hyaline and unicellular, ellipsoid or spherical; spermagonia immersed in surface of thallus or amphithecium, spherical or pyriform, opening by black ostioles, wall black or dark brown above, light brown or hyaline below, spermatophores simple or branched, spermatia oblong with acute tips or sometimes fusiform.



KEY TO THE SUBGENERA OF *PARMELIA*

- A. Always with thick rough lower cortex; rhizinae never present.  
 B. Thallus with oval perforations; spores 2-4, large.....*Menegazzia*  
 B. Thallus never with oval perforations; spores 8, small.....*Hypogymnia*  
 A. Never with thick rough lower cortex; rhizinae always present.  
 B. Thallus foliose, lobes never channeled.....*Euparmelia*  
 B. Thallus always fruticose, lobes channeled.....*Pseudevernia*

## MENEGAZZIA

I. *Parmelia* subgenus **Menegazzia** Wainio, *Étude Lich. Bresil* 1: 27. 1890.

*Menegazzia* Mass., *Neag. Lich.* 3. 1854.

The type used for the subgenus by Wainio is *Parmelia pertusa*.

Thallus always without rhizinae, attached by mucilaginous secretions; lower part of medulla composed of large dark brown or black hyphae, upper part, of small hyaline hyphae; upper cortex always perforate; ascus clavate, spores 2-4, large, hyaline.

The small number of large spores and distinctive medullary hyphae make this subgenus very different from the remainder of the *Parmeliae*. It is probable that the *Menegazziae* are not closely related to the remainder of the genus. The *Menegazziae* are represented in North America by one species, *Parmelia pertusa* (Haller) Schaer., whose distribution is in the northern or mountainous areas.

1. ***Parmelia pertusa*** (Haller) Schaer., *Lich. Helvet. Spic.*, sect. 10:457. 1840.

*Lichen pertusus* Haller, *Hist. Pl. Helvet.* 2012. 1769; Schrank, *Baier. Fl.* 2: 519. 1789.

*Lobaria terebrata* Hoffm., *Deutschl. Fl.* 2: 151. 1795.

*Lichen diatrypus* Ach., *Lichenogr. Suec. Prodr.* 116. 1798.

*Imbricaria diatrypa* DC. apud Lam. & DC., *Fl. Fr.* ed. 3, 2: 393. 1815.

Schaerer's type is 'Lichenes Helvetici Exsiccati,' 365, in *Herbier Boissier*, Université de Genève, Switzerland, the type collection having been made in the Swiss Alps. Schaerer referred to Schrank's *Lichen pertusus* (*Baierische Flora* 2: 519.



1789) but Schrank used as his type the description of *Lichen pertusus* Haller (Historia Plantarum Helvetiae, 2012. 1769). Hoffmann cites Schrank's *Lichen pertusus* as synonymous with his plant. Acharius considered *Lichen diatrypus* (Lichenographiae Suecicae Prodrumus, 116. 1798) the same as Schrank's *Lichen pertusus*. DeCandolle cites *Lichen diatrypus* Ach. as synonymous with his *Imbricaria diatrypa*.

Thallus glossy, ash-gray to greenish-brown above, closely adnate, sparingly perforated with round to oblong holes, inflated, lobes crowded, imbricated, with scattered confluent round white soredia on the rounded margins; upper and lower cortex easily separated, often pulling away and leaving the white medulla exposed, black below, brown at the margins, wrinkled; apothecia rare, 2–9 mm. diameter, sessile, disks concave, chestnut-brown; K, yellow, C, none, K + C, yellow, P, none.

Algal layer continuous, 25  $\mu$  thick; upper cortex 12.76–14  $\mu$  thick, lower cortex 15–20  $\mu$  thick; medullary hyphae 1  $\mu$  diameter, a web of heavy dark brown hyphae 3.19  $\mu$  in diameter extending from the lower part of the medulla often through cracks in the lower cortex, the line of cleavage in the inflation of the thallus being at the junction of the small hyaline hyphae and the heavy dark hyphae; thallus 600–650  $\mu$  thick; thecium 70–90  $\mu$  thick; asci clavate, spores 2–4, hyaline, ellipsoid, 20–30  $\times$  50–60  $\mu$ ; spermatia straight, cylindrical, spermagonia subspherical, ostioles not raised on the surface of the thallus.

Distribution: Nova Scotia to Maryland, west to British Columbia, south to Washington.

NOVA SCOTIA: on tree trunks, Bridgewater, Aug. 10, 1910, *Macoun 237* (MBG); on spruces, near Digby, May 20, 1910, *Macoun* (F); *Rothrock* (FM).

NEW BRUNSWICK: on trunks, Yarmouth, June 6, 1910, *Macoun* (MBG).

QUEBEC: on trees, Montmorency Falls, June 24, 1905, *Macoun 13* (F).

MAINE: KNOX CO.: on trunks of spruces, Mount Battie, Camden, May 1, 1910, *Merrill* (F).

NEW HAMPSHIRE: GRAFTON CO.: Franconia Notch, Oct. 14, 1884, *Faxon* (F). COOS CO.: on rocks, White Mountains, *Calkins* (FM); White Mountains, *Willey* (MIN).

VERMONT: ADDISON CO.: on cedar tree, Scandon Swamp, Leicester, May 22, 1920, *Dutton 1012* (MBG, FM, WIS). ORLEANS CO.: outlet Willoughby Lake, June 26, 1884, *Faxon* (WIS).



MASSACHUSETTS: BRISTOL CO.: trunks and rocks, New Bedford, *Willey 59* (FM,MBG,R).

NEW YORK: HAMILTON CO.: Indian Lake, *Peck 10* (R). WASHINGTON CO.: on bark, Archdale, Nov. 1871, *Clinton* (R).

PENNSYLVANIA: LANCASTER CO.: on trunks, Bear Town, *Eby* (MBG).

MARYLAND: ANN ARUNDEL CO.: on holly at Boiling Spring, Dec. 12, 1905, *Plitt* (BPI).

WEST VIRGINIA: POCAHONTAS CO.: Brown's Creek Road, Huntersville, Feb. 6, 1930, *Gray L1380* (NYBG).

MINNESOTA: COOK CO.: on cedars in swamp, Grand Marais, Jan. 29, 1902, *Fink 5240* (MIN).

BRITISH COLUMBIA: on limbs of trees, Vancouver Island, May 5, 1909, *Macoun 14.09* (F).

WASHINGTON: Washington Territory, *Davis* (BSNH). CHEHALIS CO.: on trunks of trees, Aberdeen, Apr. 1909, *Foster 35* (F,MIN); on trees, Montesano, June 1919, *Grant 3030* (F). KING CO.: on *Cascara*, Wynaco, 1918, *Grant* (FM).

FOREIGN AND LOCAL EXSICCATAE: *Claud. 19*; *Cromb. 145*; *Erb. I, 832*; *Flag. Lich. Fr.-C. 17*; *Hav. Occid. 18*; *Larb. Caes. 66*; *Malbr. 225*; *Malme, 176*; *Merrill, 35*; *Nyl. Par. 32*; *Picq. 74*; *Rab. Cent. 7*; *Schaer. 365*; *Trev. 156*; *Zw. 252*.

#### KEY TO SPECIES IN SUBGENUS HYPOGYMNIA

- A. Lobes always inflated.
- B. Medullary hyphae all of one type; spores spherical,  $3 \times 3$  or  $4 \times 4$   $\mu$ .... 4. *lophyrea*
- B. Medullary hyphae of two types.
- C. Usually sorediate; spores  $4-6 \times 6-8$   $\mu$ ; K, yellow, then red, C, none  
..... 2. *physodes*
- C. Rarely sorediate; spores  $4-6 \times 7-10$   $\mu$ ; K, greenish-yellow, C, none....  
..... 3. *enteromorpha*
- A. Lobes never inflated; K, none, C, none..... 5. *encausta*

#### HYPOGYMNIA

II. *Parmelia* subgenus **Hypogymnia** Nyl., *Flora* 64: 537. 1881.

Nylander's type for this subgenus is *Lichen physodes* L.

Thallus gray, yellowish-brown, or black; under-side black, roughened and without rhizinae; medulla often with a cavity; marginal or terminal soredia common except in *Parmelia enteromorpha*. The distribution of the subgenus is world-wide in the colder or mountainous regions.

2. *Parmelia physodes* (L.) Ach., *Meth. Lich.* 250. 1803.

*Lichen physodes* Linn., *Sp. Pl.* 1144. 1753.

*Lichen laciniatus* var. *physodes* Weis, *Pl. Crypt. Fl. Goetting.* 57. 1770.



*Lobaria physodes* Hoffm., *Deutschl. Fl.* 2: 150. 1795.

*Imbricaria physodes* DC. apud Lam. et DC., *Fl. Fr.* ed. 3, 2: 393. 1815.

*Parmelia physodes* var. *vulgaris* Th. Fries, *Lichenogr. Scand.* 1: 117. 1871.

*Menegazzia physodes* Navas, *Lich. de Aragon*, 25, 1908.

The type of the species used by Acharius is based on a collection in the Herbarium of Linnaeus. He cites as synonymous Jacquin 'Collectanea ad Botanicam' 3: t. 8, f. 2 & 3. 1789, Hoffmann, 'Enumeratio Lichenum,' t. 15, f. 2a & b. 1784, and Dillenius, 'Historia Muscorum,' t. 20, f. 49. 1741. The collection of the type species was from trees or rocks in northern Europe. The type of F. W. Weis, given in 'Plantae Cryptogamicae Florae Goettingensis,' 57. 1770 is based on t. 20, f. 49 in Dillenius, 'Historia Muscorum,' Acharius, 'Lichenum Suecicae Prodrromus,' 115. 1798, and Wulfen apud Jacquin 'Collectanea' 3: t. 8, f. 2 & 3. Wallroth considered his *Parmelia ceratophylla* var. *phyllodes* the same as Dillenius' plant.

Thallus middle-sized to large, irregular in outline, 5–15 cm. diameter, loosely adnate, lobes inflated, long, narrow, dichotomously branched, imbricated, usually with marginal soredia, often with slightly raised tips; upper surface smooth, greenish-gray to whitish, margins often brownish or black, lower surface black, without rhizinae, roughened and much wrinkled; cortex continuous except at junction of lower and upper cortex, where it is often broken exposing the white medulla; apothecium sessile or short-pedicellate, 2–15 mm. diameter, disk concave, chestnut-brown, margin of the apothecium entire, smooth; K, yellow, then red, C, none, K + C, brown, P, red.

Algal layer continuous or cells grouped, 10–15  $\mu$  thick; upper cortex 12–18  $\mu$  thick, cells of the vertical hyphae small and hyaline but separated by a dark brown matrix, giving the appearance of a brown net; medulla of loosely interwoven hyphae of two types, (1) those on the upper side hyaline and of small diameter, (2) those on the lower side dark brown and of large diameter, the inflation of the thallus occurring at the junction of the two types; lower cortex 12–20  $\mu$  thick, matrix dark brown



or black; thickness of the thallus extremely variable, 30–200  $\mu$ ; thecium 30–36  $\mu$  thick; ascus clavate or almost spherical, spores 8, 4–6  $\times$  6–8  $\mu$ ; paraphyses branching once or twice, tips slightly enlarged.

Distribution: Labrador to northern Alabama, west to British Columbia, south to California.

LABRADOR: on earth, Forteau, Sept. 19, 1889, *Waghorne 69* (MIN); on branches of spruce, Aug. 23, 1896, *Low* (F).

NEWFOUNDLAND: on trees, Coria Cove, Bay of Tiland, Sept. 15, 1856, *Waghorne* (MBG); on rocks, Hodges Cove, Trinity Bay, June 29, 1885, *Waghorne 10* (MBG); Chance Cove, Trinity Bay, May 24, 1893, *Waghorne* (MBG); Chance Cove, Trinity Bay, May 26, 1893, *Waghorne* (MIN); on trees, "Bay of Bull Coeur," May 28, 1893, *Waghorne* (MIN); on trees, New Haven, June 21, 1893, *Waghorne 32* (MIN); on gravelly sand, July 27, 1893, *Waghorne* (MIN); on trees, New Harbor, Sept. 21, 1893, *Waghorne 69* (MIN); on rocks, Hodges Cove, Random, Mar. 22, 1895, *Waghorne* (MBG); on trees, Cold Cove, Bay of Hand, Sept. 15, 1896, *Waghorne 69* (MIN).

NOVA SCOTIA: *Rothrock* (FM).

NEW BRUNSWICK: Little Branch, Miramichi, June 15, 1897, *Fowler* (F).

QUEBEC: alluvial woods along Riviere Cap Chat, July 6, 1923, *Collins & Dodge* (D); on rocks covered by mould, Ste. Anne, May 11, 1935, *Lepage 143* (D); on rotten logs, Ste. Anne, May 30, 1935, *Lepage 480* (D); dry peaty knowls and slopes by Lac Pierre, elev. about 1100 m., Table Top Mountain, Aug. 6, 1923, *Fernald, Dodge & Smith* (D).

ONTARIO: on rocks and trees, Ottawa, Apr. 26, 1891, *Macoun* (MBG); on trunks, Ottawa, May 16, 1903, *Macoun 242* (MBG); on rocks and trees, Ottawa, Apr. 26, 1891, *Macoun 77* (MIN,WIS); on fences and tree trunks, Apr. 24, 1892, *Macoun* (MBG); Rainy Lake, Aug. 20, 1930, *Schmidt* (MBG); on trees, Emo, July 18, 1901, *Fink 719* (MIN).

MAINE: WASHINGTON CO.: June 1929, *Markin* (WIS). HANCOCK CO.: Winter Harbor, Apr. 30, 1923, *Norton* (F); Mount Desert, July 1928, *Markin* (WIS). KNOX CO.: on rocks, Mount Battie, *Merrill* (F).

NEW HAMPSHIRE: CARROLL CO.: Chocorua, Aug.-Sept. 1911, *Farlow 479b* (F,WIS). GRAFTON CO.: on coniferous trees, Plymouth, Mar. 31, 1891, *Cummings 9b* (WIS,MBG); on coniferous trees, North Woodstock, Franconia Mountains, July 27, 1891, *Cummings 9a* (WIS,MBG). SULLIVAN CO.: spruce and hemlock woods, elev. 1460 ft., Lempster, Aug. 1927, *Butler* (FM).

VERMONT: WINDHAM CO.: Grout Pond, Stratton, July 4, 1925, *Moore* (MBG). ADDISON CO.: Middlebury, Apr. 1913, *Dodge 152* (D); on roots of *Pinus Strobus*, Middlebury, May 7, 1913, *Dodge* (D); Green Mountain Chain beyond Breadloaf, Ripton Hancock Road, July 29, 1916, *Dodge* (D); on cedar trees, Leicester Brook Swamp, elev. 350 ft., Feb. 2, 1920, *Dutton 966* (F); Bristol Bog, June 24, 1927, *Dodge* (D); Starksboro Bog, June 25, 1927, *Dodge* (D); Monkston, June 25, 1927, *Dodge* (D). RUTLAND CO.: Brandon, March 12, 1911, *Dutton* (MBG); on cedar trees in swamp, Brandon, Feb. 26, 1921, *Dutton 1216* (WIS,FM); Chipman Lake, Tinmouth, June 1938, *Dodge* (D).



MASSACHUSETTS: MIDDLESEX CO.: Pepperell Station, Oct. 1926, *Dodge* (D). BRISTOL CO.: trees and rocks, New Bedford, *Hall 38* (FM). WORCESTER CO.: 1885, *Sargent 424* (F).

CONNECTICUT: WINDHAM CO.: on tree, Pomfret, Oct. 29, 1925, *Evans 605* (F).

NEW YORK: ESSEX CO.: on mosses near Lake Placid, Sept. 1-16, 1898, *Britton* (F); on spruce, Lake Placid, Sept. 27, 1914, *Humphrey* (WIS); on balsam, Mount Marcy, near Lake Placid, elev. 5300 ft., Aug. 16, 1933, *Lowe 2830* (F). YATES CO.: Dundee, *S. Wright* (FM); on dead twigs of balsam fir, Dec. 31, 1894, *Galway* (F). Dundee, *S. Wright* (FM); on dead twigs of balsam fir, Dec. 31, 1894, *Galway* (F).

NORTH CAROLINA: WATAUGA CO.: on bark of trees, Grandfather Mountain, June 16, 1923, *Schallert* (F); SWAIN CO.: deep wet woods, Clingmans Dome, elev. 6600 ft., Aug. 25, 1937, *Hubricht B554* (MBG); woods, elev. 5500 ft., Newfound Gap, Aug. 25, 1937, *Hubricht* (MBG).

OHIO: MAHONING CO.: on old stump, Ellsworth, Apr. 1910, *Vickers 39* (BPI).

WEST VIRGINIA: POCAHONTAS CO.: on dead spruce, Bald Knob, July 19, *Gray* (F); MERCER CO.: on roof of shed near Coopers Rock, July 28, 1907, *Sheldon 1056* (F).

MICHIGAN: CHEBOYGAN CO.: Mud Lake Bog, vicinity of Burt and Douglas lakes, June-Aug. 1923, *Nichols* (F). KEWEENAW CO.: on conifer, McCargo Cove, Isle Royale, Aug. 4, 1930, *Lowe 314* (F); Isle Royale, Sept. 10, 1901, *Stuntz & Allen* (WIS); on birch, Rock Harbor, Isle Royale, Aug. 1904, *Harper & Harper 173* (FM).

INDIANA: COUNTY UNKNOWN: on trees, 1827, *Engelmann* (MBG).

TENNESSEE: HAMILTON CO.: on oaks, Lookout Mountain, *Calkins 288* (FM); SEVIER CO.: deep wet woods, Clingmans Dome, elev. 6600 ft., Aug. 25, 1937, *Hubricht* (MBG); woods, elev. 5500 ft., Newfound Gap, Aug. 25, 1937, *Hubricht B554* (MBG).

WISCONSIN: VILAS CO.: valley of the Wisconsin River, near Lac Vieux Desert, June 13, 1893, *Cheney 67* (WIS); Lost Creek, near Sayner, Aug. 30, 1938, *J. Thomson* (WIS). TAYLOR CO.: valley of the Wisconsin River near Goodrich, summer 1894, *Cheney* (WIS). FOREST CO.: on soil east of Three Lakes, May 30, 1938, *Wolf 6* (WIS).

ILLINOIS: county unknown: *Calkins* (FM).

MINNESOTA: LAKE CO.: on trees, Snowbank Lake area, July 21, 1897, *Fink 863* (MIN). ST. LOUIS CO.: on cedar in swamps, Harding, Aug. 17, 1901, *Fink 1553* (MIN); on rocks, Tower, Aug. 24, 1901, *Fink 1720* (MIN). CARLTON CO.: on trees, Kettle Falls, Aug. 12, 1901, *Fink 1402* (MIN); on trees, Tafte, Carlton Peak, July 10, 1897, *Fink 565* (MIN). KOOCHICHING CO.: on trees and rocks, Gunflint, July 2, 1897, *Fink 383* (MIN); on trees, Koochiching, July 27, 1901, *Fink 965* (MIN); on rocks, Koochiching, July 31, 1901, *Fink 1050* (MIN); on rocks, Rainy Lake City, Aug. 1, 1901, *Fink 1099* (MIN); on trees, Rainy Lake City, Aug. 7, 1901, *Fink 1267* (MIN). BELTRAMI CO.: on tamarack in swamp, Red Lake, July 27, 1900, *Fink 913* (MIN); on pines, Bemidji, July 4, 1900, *Fink 429* (MIN); in swamps, Beaudette, June 18, 1901, *Fink 28* (MIN); on trees, Red Lake, Aug. 3, 1900, *Fink 1071* (MIN); on trees in swamps, Beaudette, June 18, 1901, *Fink 6* (MIN); on pine, Bemidji, July 12, 1900, *Fink 669* (MIN); on tamarack and red cedar in a tamarack swamp, Bemidji, July 9, 1900, *Fink 514* (MIN). CASS CO.: on trees and rocks, Grand Portage Island, June 23, 1897, *Fink 143* (MIN). OTTERTAIL CO.: on tamarack in



swamps, Henning, June 28, 1900, *Fink 331* (MIN). ROSEAU CO. on tamarack in swamp, Warroad, June 28, 1901, *Fink 246* (MIN).

SOUTH DAKOTA: COUNTY INDEFINITE: Black Hills, *Macbride* (IA).

MONTANA: CLARK CO.: on live *Salix*, S. 11. T. 12 N. R 9 W., Jefferson Creek, Helena, Aug. 15, 1931, *Flint* (MONT). MISSOULA CO.: north slope of Mitten Mountain, Dec. 13, 1932, *Flint, Jr.* (MONT). COUNTY INDEFINITE: Douglas fir bark, both dead and green trees, sect. 19. T. 12 N. R 6 W., elev., 5000 ft., May 28, 1931, *Flint* (MONT.)

NEW MEXICO: COLFAX CO.: on *Pseudotsuga mucronata*, vicinity of Ute Park, elev. 2200–2900 m., Aug. 21, 1916, *Standley* (F).

ALBERTA: Banff, woods, Oct. 1910, *Swanson 354* (F); Sulphur Mountain, Oct. 18, 1918, *Swanson S72* (F).

IDAHO: IDAHO CO.: by the highway near Locha River west of Lolo Pass, Sept. 15, 1937, *Barkley 1576* (MONT).

BRITISH COLUMBIA: Ucluelet, on old logs and rocks, May 11, 1909, *Macoun* (MBG); Lilloet, July 1916, *Macoun* (F); New Westminster, Jan. 1903, *Merrill* (F).

WASHINGTON: SPOKANE CO.: on bark of *Pinus ponderosa*, 5 miles southwest of Spokane, May 30, 1933, *Flint* (MONT). COLUMBIA CO.: on branches, Blue Mountains, Oct. 17, 1831, *Howard 1620a* (W). PIERCE CO.: on trees, Longmires Springs, Aug. 1906, *Harper & Harper 255* (FM); Sumner, June 1906, *Harper & Harper 254* (FM). ISLAND CO.: on log, Langley, *Grant* (FM); on trees, Langley, 1926, *Grant* (WIS); on trees, Langley, 1923, *Grant* (W); on rock, Langley, June 1923, *Grant* (W); Goose Rock, July 1923, *Grant* (W). SAN JUAN CO.: San Juan Island, July 1906, *Harper & Harper* (FM). CLALLAM CO.: on roof, Sequim, 1915, *Grant 213* (F). COUNTY UNKNOWN: on wood, *Calkins* (MBG).

CALIFORNIA: MARIN CO.: on trees, Mar. 29, 1893, *Howe 25* (MBG); COUNTY INDEFINITE: on limbs of Manzanita bush, Cuyamaca Mountains, elev. 4500 ft., 1932, *Cota* (MBG).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Cum. I *9a, b*; Tuck. II–IV *72*; *P. physodes austerodes* Norrl. & Nyl. *209a, b*.

This species is distributed in the cooler and mountainous regions of both hemispheres. It commonly grows on rocks, but may be found on tree trunks and more rarely on earth. In North America, collections have been made from Labrador to North Carolina on the east coast, and from Alaska to central California on the west coast. Collections in the interior of the country, except in the mountains, have not been made south of Illinois. Workers with North American lichens have often recognized *Parmelia physodes* var. *labrosa* Ach., *Parmelia physodes* var. *obscura* Ach., *Parmelia physodes* var. *platyphylla* Ach. and *Parmelia physodes* var. *vittata* Ach. as distinct. These forms seem to be valid for European material, but not for that from North America. The plants from North America



bearing these names are environmental variants rather than distinct varieties of the species *P. physodes* Ach.

**3. *Parmelia enteromorpha*** Ach., Meth. Lich. 252. 1803.

*Lichen intestinalis* Sm. apud Ach., Meth. Lich. 252. 1803.

*Parmelia physodes* var. *enteromorpha* Tuck., Proc. Amer. Acad. Arts & Sci. 1: 220. 1848.

*Hypogymnia enteromorpha* Nyl., Acta Soc. Sci. Fenn. 26<sup>10</sup>: 7. 1900.

*Imbricaria enteromorpha* Jatta, Nuov. Giorn. Bot. Ital. N. S. 9: 471. 1902.

Acharius' type was Menzies' collection from the west coast of North America, near Monterey, California. The type is now in Acharius' Herbarium in Helsinki, Finland. Acharius cites as a synonym of his species J. E. Smith's *Lichen intestinalis* from Menzies' type. Tuckerman used as the type of his variety *enteromorpha* a duplicate collection of Menzies' which is probably co-type material. The type of the variety is in Tuckerman's Herbarium in the Farlow, at Harvard University. Nylander's and Jatta's synonyms were based on Menzies' collection and arose from the renaming of the genus.

Thallus large, loosely attached; upper surface green, dingy gray or brownish, smooth, with numerous black dots which are the open ostioles of the spermagonium; lobes numerous, long, narrow, inflated or occasionally broad at the tip; lower surface black, rough; lower cortex often cracked or broken, exposing the white medulla; apothecium abundant, short-pedicellate, 5–8 mm. diameter, disk concave, flat or sometimes convex, occasionally perforate at the center, pedicel always hollow, amphithecium entire or lobed; K, yellow or greenish-yellow, C, none, K + C, yellow, P, yellow.

Algal layer continuous, 12–15  $\mu$  thick; upper cortex 9–19  $\mu$  thick; medulla loosely interwoven with a central cavity, hyphae of two types, (1) large, brown, 2–3  $\mu$  in diameter, and (2) hyaline, 1  $\mu$  or less in diameter, the large dark brown hyphae being on the lower side of the thallus and an inflation occurring at the junction of the two types; lower cortex 24–27  $\mu$  thick, matrix brown; thecium 21–25  $\mu$  thick; ascus clavate, spores 8, 4–6  $\times$  7–10  $\mu$ ; paraphyses branched.



Distribution: Labrador to Virginia, west to Alaska, south to California.

LABRADOR: on earth, Oct. 18, 1894, *Waghorne* (MIN).

NEWFOUNDLAND: on sand, July 27, 1893, *Waghorne* (MBG); on earth, Sept. 28, 1894, *Waghorne* (MBG); on earth, Bay Island, Aug. 22, 1896, *Waghorne* (MBG); sea cliff, Goose Arm, Bay of Hand, Sept. 22, 1896, *Waghorne* (MBG); on earth, Sept. 28, 1899, *Waghorne* (US).

MAINE: HANCOCK CO.: Beech Mountain, July 8, 1894, *Merrill 89* (WIS). KNOX CO.: on spruces, Camden, 1910, *Merrill 89* (WIS). YORK CO.: Saco, 1863, *Blake* (FM).

NEW HAMPSHIRE: COOS CO.: White Mountains, 1863, *Mann* (FM); base of Mount Washington, Aug. 6, 1895, *Harper & Harper 35* (FM). GRAFTON CO.: on coniferous trees, North Woodstock, Franconia Mountains, July 27, 1891, *Cummings* (MBG).

VERMONT: LAMOILLE CO.: on twigs, Mount Mansfield, Aug. 11, 1851, *Russell* (R).

VIRGINIA: WASHINGTON CO.: summit of White Top Mountain, elev. 5678 ft., May 28, 1892, *Small* (MIN).

NORTH CAROLINA: MITCHELL CO.: on trees, Roan Mountain, June 15, 1936, *Schalert* (B).

MONTANA: FLATHEAD CO.: 2½ miles up Glen Trail east from Flathead Lake, Nov. 18, 1934, *Flint* (MONT); Columbia Falls, Sept. 26, 1892, *Williams 2b* (MIN). MISSOULA CO.: dead twigs of conifer, north slope of Mitten Mountain, near Missoula, elev. 3500 ft., Dec. 1930, *Flint* (MONT); on dead twigs of Douglas fir, Kitchen Gulch near Clinton, Nov. 25, 1931, *Flint* (MONT); north slope of Mitten Mountain, elev. 3700 ft., near Missoula, *Flint* (MONT).

WYOMING: on dead twigs of *Pinus contorta*, Snake River drainage of Yellowstone Park, elev. 7000 ft., July 20, 1931, *Flint* (MONT).

IDAHO: NEZ PERCE CO.: above Lake Waha, elev. 2000–3500 ft., June 3, 1896, *Heller & Heller* (MBG). KOOTENAI CO.: on upper branches of *Pinus monticola*, head of Little Lost Fork, Big Creek, Coeur d'Alene, Aug. 30, 1931, *Flint* (MONT).

MACKENZIE TERRITORY: Arctic Ocean, Elephant Point, Eschscholtz Bay, Sept. 1880, *Bean* (FM).

YUKON: on trunks in woods, The Cone, 1902, *Macoun* (MBG).

ALASKA: on hemlocks, Windham Bay, elev. 1700 ft., Oct. 4, 1905, *Culbertson 126* (FM,F); Cooks Inlet, Fort Alexander, 1880, *Bean* (FM).

BRITISH COLUMBIA: Vancouver Island, Oregon Boundary Commission, 1858–59, *Lyall* (R,WIS); on trees and rotten logs, Victoria, Vancouver Island, May 1887, *Macoun 69* (MIN,WIS); on trees, Donald, July 6, 1885, *Macoun* (MBG); on old wharf of Comox, June 23, 1893, *Macoun* (US); on branches of trees and bushes, Victoria, Vancouver Island, July 23, 1887, *Macoun* (MBG); Surrey, *Hill* (F); near McLeod Lake, June 27, 1875, *Macoun* (F); northwest coast of North America, 1901–02, *Newcombe 148* (FM).

WASHINGTON: SNOHOMISH CO.: Snohomish, *Harper & Harper 277* (FM). PEND D'OREILLE CO.: Pend d'Oreille, Oregon Boundary Commission from Fort Colville to Rocky Mountains, 1861, *Lyall* (R). SPOKANE CO.: high up in old yellow pine, 6 miles south of Spokane, Apr. 29, 1934, *Flint* (MONT); bark of *Pinus ponderosa*, 5 miles southwest of Spokane, May 31, 1939, *Flint* (MONT). WHITMAN CO.: very abundant on lower dead branches of yellow pine, along Palouse River near Palouse,



Aug. 12, 1938, *Ownbey & Ownbey* (MBG). STEVENS CO.: on wood, Kettle Point, July 3, 1907, *Cowles 318a* (FM). PIERCE CO.: on trees, Longmires Springs, Aug. 1906, *Harper & Harper* (FM); Ashford, Aug. 1906, *Harper & Harper* (FM); Sumner, June 1906, *Harper & Harper* (FM). ISLAND CO.: on logs, Langley, 1922, *Grant* (WIS). SAN JUAN CO.: Rock Harbor, July 3, 1905, *Frye* (F); San Juan Island, July 1906, *Harper & Harper* (FM); on wood, Friday Harbor, July 2, 1907, *Cowles 318* (FM). CLALLAM CO.: on rocks, Port Angeles, Mar. 5, 1914, *Foster 2636* (F). CHEHALIS CO.: on trees near Aberdeen, Apr. 1909, *Foster* (MIN). COUNTY UNKNOWN: on trees, *Calkins* (MIN); Washington Territory, *Davis* (BSNH).

OREGON: WALLOWA CO.: on branches of fir, Wallowa Mountains, between Cove and Minam River, elev. 5100 ft., Sept. 21, 1897, *Sheldon* (FM,US). COUNTY INDEFINITE: on rails and trees, *Calkins* (FM); Coast Range, May 1905, *Buhl 5* (FM); Cascade Mountains, *Hall 18* (FM).

CALIFORNIA: SAN BERNARDINO CO.: pine crest, San Bernardino Mountains, Aug. 1912, *Hasse* (F); dead brush of yellow pine, San Bernardino Mountains, elev. 4500 ft., May 23, 1932, *Reed* (MBG). SAN DIEGO CO.: branches of dry scrub oak, 3 miles north of Alpine, June 1932, *Cota* (US); shady dry limbs, Manzanita brush, elev. 4500 ft., 1932, *Cota* (US); Ward Canyon, Feb. 1933, *Cota* (FM). LOS ANGELES CO.: on *Rhamnus*, Santa Catalina Island, Nolava Canyon, June 30, 1920, *Nuttall 514* (FM); on [*Quercus* ?] "Macrocarpa" bark, head of Benedict Canyon, Santa Monica Mountains, elev. 1200 ft., Mar. 14, 1933, *Wheeler 1554* (US). SAN JOAQUIN CO.: Castle Rock Ridge, Aug. 10, 1906, *Herre* (MBG). MONTEREY CO.: Monterey, 1790, *Menzies* (probably Co-type) (T); on branches of *Pinus radiata*, Rat Hill, Point Lobo Reserve, elev. 130 ft., Aug. 1, 1936, *Wheeler* (MBG). SANTA CLARA CO.: trees and shrubs, Black Mountain, elev. 1500-2785 ft., July 6, 1903, *Herre 122* (MIN,MBG); on trees, Kings Mountain, Purisima Creek, elev. 1900 ft., July 24, 1903, *Herre 179* (MIN); on fences, 4 miles west of Stanford University, elev. 400 ft., Oct. 1, 1903, *Herre 338* (MIN,MBG). SAN MATEO CO.: abundant on trees and fences along summit of range, Kings Mountain, May 19, 1902, *Baker* (WIS). SANTA CRUZ CO.: on old fences along summit of range, Santa Cruz Mountains, elev. 2000-2200 ft., Apr. 5, 1905, *Herre 633* (MBG,MIN). GLENN CO.: on trees, Plaskett Meadows, 8 miles southeast of Mendocino Pass, July 12, 1938, *Ownbey & Ownbey* (MBG). MARIN CO.: on trees, Mar. 29, 1893, *Howe* (US,MIN,WIS); on trees, Apr. 5, 1893, *Howe* (F,MBG). COUNTY UNKNOWN: on *Pinus insignis* and oaks, 1864, *Bolander* (FM,US); on rails and trees, *Calkins* (FM).

The plant is entirely western and alpine in its distribution. It is typical when found in the more humid sections of the red-wood forests in California and Oregon. Those plants which come from the arid regions of California are small and depauperate. Collections of this plant are distinguishable from *P. physodes* by the larger size of the narrow lobes, the lack of soredia, and brown rather than gray color.

#### 4. *Parmelia lophyrea* Ach., Meth. Lich. 198. 1803.

*Parmelia cribellata* Tayl., Hook. London Jour. Bot. 6: 164. 1847.



Acharius' description was based on Menzies' collection from near Gray's Harbor, Washington. The type is in his herbarium at Helsinki, Finland. The type for Taylor's plant was Menzies' collection, and probably co-type material is now in the Taylor Collection at the Boston Society of Natural History, in Boston.

Thallus small, greenish-gray to ashy, loosely adnate to bark of trees and shrubs; upper surface smooth or occasionally with scattered white soredia, lobes long, narrow, branched, margins cut, crenate, tips somewhat inflated; lower surface black and roughened, with reticulate pits or perforations; apothecium sessile, 3–8 mm. diameter, disk concave, reddish-brown; amphithecium entire and not sorediate; K, yellowish-green, C, none, K + C, none, P, none.

Algal layer continuous, 6–18  $\mu$  thick; upper cortex 15–18  $\mu$  thick, matrix dark brown, cells in the corticellular hyphae small; medulla of loosely interwoven hyphae, tending to form cavities in older portions of the thallus and at the tips of the lobes, hyphae all of one type, 1–3  $\mu$  in diameter, hyaline; lower cortex 65–68  $\mu$  thick, cells of hyphae rectangular, octagonal or spherical, 6–9  $\mu$  in diameter, matrix brown; thecium 21–24  $\mu$  thick, hypothecium hyaline, 6–8  $\mu$  thick; ascus short-cylindrical, spores 8, spherical, 3  $\times$  3 or 4  $\times$  4  $\mu$ ; paraphyses very small in diameter, branched.

Distribution: collected only in the Olympic Mountains of Washington.

WASHINGTON: CHEHALIS CO.: Westport, Apr. 1908, *Foster 509a* (F); Nov. 22, 1904, *Foster* (F). CLARKE CO.: Vancouver's Voyage, 1790–1792, *Menzies* (Co-type collection) (T); northwest coast, 1835–36, *Nuttall* (T).

Menzies' collection in Taylor's Herbarium of the Boston Society of Natural History is the same as Tuckerman's, but it bears the determination of *Parmelia cribellata* Taylor, of which it is the type.

**5. *Parmelia encausta* (Sm.) Ach., Meth. Lich. 202. 1803.**

*Lichen encaustus* Sm., Trans. Linn. Soc. London **1**: 83. 1791.

*Imbricaria encausta* DC. apud Lam. & DC., Fl. Fr. ed. 3, **2**: 394. 1815.

*Parmelia physodes* var. *encausta* Fries, Lichenogr. Eur. Reform., 64. 1831.



Smith's type is no longer in existence, but he gives the drawing in *Trans. Linn. Soc. London* 1: *t. 4, f. 6*. Acharius' type is in his herbarium in Upsala, Sweden; he cites as synonymous with his plant Smith's *Lichen encaustus*, *Trans. Linn. Soc. London* 1: 83. 1791. DeCandolle's type is not in existence, but he gives Smith's *Lichen encaustus* as a synonym of it. Fries cites *Lichen encaustus* and also lists Moug. & Nestl., *Stirpes Crypt.* 353, as his type.

*Parmelia encausta* (Sm.) Ach. is found on rocks in the alpine regions of both North America and Europe. It is distinguished from *Parmelia physodes* (L.) Ach. by the narrowness of the lobes and the size of the spores.

Thallus small, adnate to rocks, lobes long, narrow, dichotomously branched, imbricated, tips lighter-colored than the thallus, a dense layer of narrow, secondary, dichotomously branched, imbricated lobes arising from the central portion of the thallus; under surface brown at the margins, becoming dark brown or black at the center, rough; apothecium sessile, 1-6 mm. diameter; amphithecium with slightly concave crenulate margin; no chemical reaction with either K, C, or P.

Algal layer of scattered gonidia 5-6  $\mu$  in diameter; upper cortex 9-10  $\mu$  thick; medulla loosely interwoven, hyphae small and of one type; lower cortex 30-40  $\mu$  thick; thallus 120-180  $\mu$  thick; thecium 45-50  $\mu$  thick, hypothecium 18-20  $\mu$  thick; ascus clavate, 8-spored, spores 4-7  $\times$  5-9  $\mu$ , hyaline; paraphyses branched.

The external appearance of the plant is similar to *P. centrifuga* except that it is smaller and darker in color.

Distribution: Labrador to North Carolina, west to Alberta and Montana.

LABRADOR: on rock, Capstan Island, Aug. 1, 1889, *Waghorne* 32 (MIN).

NEWFOUNDLAND: on rocks, *Waghorne* (MBG, FM).

NEW HAMPSHIRE: COUNTY UNKNOWN: on rocks, *Willey* (FM).

NORTH CAROLINA: FORSYTH CO.: Winston-Salem, May 1, 1926, *Schallert* (BPI).

MONTANA: LEWIS & CLARK CO.: bark of Douglas fir, near Helena, Dec. 1931, *Flint* (MONT).

ALBERTA: on rocks, Mount Fairview, elev. 9000 ft., Aug. 9, 1906, *Fink* (F).

FOREIGN AND LOCAL EXSICCATAE EXAMINED: *Desm.* ed. I. ser. I. 1493; ed. II. ser. I. 1593; *Erb.* I, 119; *Funck*, I, 374; *Harm.* 66; *Harm. Lich. Loth.* 319; *Hav.* 222; *Lojk. Univ.* 63; *Moug. et Nest.* 353; *Roum.* 40; *Stenh.* 67; *Wartm.* 740.



## EUPARMELIA

III. *Parmelia* subgenus **Euparmelia** Nyl. apud Hue, *Revue de Bot.* 4: 375. 1885–86.

Nylander's type of the subgenus is *Parmelia caperata* (L.) Ach.

Thallus foliose, under-surface never with a thick, rough, black, lower cortex, rhizinae always present, either evenly distributed or at the points of contact with the substratum; medulla of loosely interwoven hyphae, never with a cavity or a central strand. The subgenus is world-wide in its distribution.

## KEY TO SECTIONS OF EUPARMELIA

- A. Rhizinae small and evenly distributed.
  - B. Thallus dark, some shade of brown.....*Melanoparmelia*
  - B. Thallus light, some shade of yellowish-green.....*Xanthoparmelia*
- A. Rhizinae large.
  - B. Rhizinae evenly distributed.....*Hypotrachyna*
  - B. Rhizinae at points of contact with substratum, margins nude....*Amphigymna*

## KEY TO SPECIES IN EUPARMELIA SECT. MELANOPARMELIA

- A. With coralloid branchlets or soredia.
  - B. Lobes broad, always wider than long.
    - C. Amphithecium and upper surface hispid.....9a. *olivacea* var. *aspidota*
    - C. Always sorediate .....11. *conspurcata*
  - B. Lobes narrow, always longer than wide.
    - C. Marginal lobes fibrillose, cylindrical.....6. *pubescens*
    - C. Marginal lobes never fibrillose or cylindrical.
      - D. Lobes variously branched, imbricated at tips.....8. *prolixa*
      - D. Lobes digitately branched, tips rounded.....12. *exasperata*
- A. Without coralloid branchlets or soredia.
  - B. Lobes broad, always wider than long.
    - C. No reaction with either K or C.
      - D. Spores always 8.....9. *olivacea*
      - D. Spores 16–24 or more.....10. *multispora*
    - C. Chemical reaction, K, yellow, C, red.....9b. *olivacea* var. *glabra*
  - B. Lobes narrow, always longer than wide.....7. *stygia*

## I. MELANOPARMELIA

*Parmelia* subgenus **Euparmelia** sect. I. **Melanoparmelia** (Hue) Zahlbr. apud Engl. & Prantl, *Nat. Pflanzenfam.* 1 Teil, Abt. 1: 212. 1907.

*Parmelia* sect. *Melanoparmelia* Hue, *Nouv. Arch. du Mus. Paris*, I, 4:138. 1899.

The type of the section is *Parmelia stygia* (L.) Ach.



Thallus greenish-brown to blackish, under-surface sparingly covered with rhizinae; apothecia sessile.

6. *Parmelia pubescens* (L.) Wainio, Meddel. Soc. Fauna & Fl. Fenn. **14**: 22. 1888.

*Lichen pubescens* Linn., Sp. Pl. 83. 1753.

*Cornicularia pubescens* Ach., Lichenogr. Suec. Prodr. 217. 1798.

Wainio's type is *Lichen pubescens* in the Linnean Herbarium, London, England. The type locality is in the mountains of Europe. Linnaeus based his name on the plant in his herbarium. Acharius' type is in his herbarium at Upsala, Sweden. He cites as synonyms *Lichen pubescens* Linn. and *Lichen lanatus* Wulf. apud Jacq. (Misc. Aust. **2**: t. 10, f. 5. 1778).

The lichen has a limited distribution on the mountains of North America and Europe. It has often been misdetermined because of the fibrillose character of the margins of the thallus.

Thallus small, loosely attached, somewhat ascending; upper surface smooth, black, lobes long, round or slightly flattened on the under side, dichotomously branched, much imbricated, those at center of thallus wrinkled; lower surface smooth, lighter in color than the upper surface, rhizinae small; apothecium sessile, 0.5–1 mm. diameter, disk flat, dark brown or black, margin of amphithecium smooth; K, brown, C, none, K + C, none, P, none.

Algal layer in the center of the lobes, very thin and scattered in the flattened portions at the center of the thallus; upper cortex 3  $\mu$  thick, matrix yellow-brown; medulla loosely interwoven and with a central cavity; lower cortex 6  $\mu$  thick, lower edge much roughened; thickness of thallus 60–80  $\mu$ ; thecium 55–60  $\mu$  thick; ascus clavate, 8-spored, spores 4–5  $\times$  4–6  $\mu$ ; paraphyses branched.

Distribution: Labrador, west to Washington, south to California.

LABRADOR: on rocks, Bath Harbor, June 25, 1892, *Waghorne 71* (MIN); on rock, Early Harbor, July 29, 1892, *Waghorne 170* (MIN).

NEWFOUNDLAND: on rock, Aug. 25, 1852, *Waghorne* (MBG).

MONTANA: TETON CO.: Observation Mountain, Black Foot Indian Reservation, Aug. 25, 1897, *Williams 107* (NYBG); on basalt rocks and occasionally on bark of yellow pine, near Fort Wright, Apr. 8, 1934, *Flint* (MONT).



COLORADO: COUNTY UNKNOWN: 10,000 ft. elev., May 1880, *Brandegee 115* (BSNH).

BRITISH COLUMBIA: on rocks, summit of Mount Benson, July 10, 1893, *Macoun* (MBG).

WASHINGTON: SPOKANE CO.: on basaltic rocks, near Crater Basin, Dec. 1909, *Bowser 88* (F). YAKIMA CO.: Mount Adams, *Suksdorf 147* (BSNH). KLIICKITAT CO.: thin earth over boulder, Goldendale, 1909, *Foster 135* (WIS,FM). COUNTY UNKNOWN: on rocks, *Calkins 354* (F).

OREGON: COUNTY UNKNOWN: *Hall* (MBG,FM).

CALIFORNIA: TUOLUMNE CO.: rocks at Clawel's resort above Yosemite Valley, elev. 6000 ft., Apr. 1900, *Hasse 571* (NYBG).

FOREIGN EXSICCATAE EXAMINED: Malme, 405; *P. lanata* Erb. I 1221; Fellm. 82; Harm. Lich. Loth. 315; Hav. 181; Roum. 558; Wartm. 741; *P. pubescens* f. *minuscula* Fellm. 83.

**7. *Parmelia stygia* (L.) Ach., Meth. Lich. 203. 1803.**

*Lichen stygius* Linn., Sp. Pl. 1143. 1753; Ach., Lich. Suec. Prodr. 109. 1798.

*Lobaria stygia* Hoffm., Deutschl. Fl. 2: 154. 1795.

*Imbricaria stygia* DC. apud Lam. & DC., Fl. Fr. ed. 3, 6: 189. 1815.

Acharius' and Linnaeus' types are not in either herbaria at present. Acharius (Lich. Suec. Prodr.) cites as synonyms of his plant *Lobaria stygia* Hoffmann, 'Enum. Lich.,' t. 14, f. 2. 1784, and *Squamaria stygia* Hoffmann, 'Descr. & Adumbrat. Pl. Lich.' 2: t. 25, f. 2. 1794. DeCandolle considers *Parmelia stygia* (L.) Ach., 'Meth. Lich.' 203. 1803, and *Lobaria stygia* Hoffm. 'Enum. Lich.,' t. 14, f. 2, the same as his plant. The plants figured by Hoffmann came from the alpine regions of Europe, and should be considered as typical.

Thallus small, loosely adnate to rock, irregular in outline; upper surface smooth, brown or shining black, lobes long, narrow, flat, irregularly branched and twisted, often convex, tips raised, upper cortex brown; under surface black, wrinkled, and with many short black rhizinae; apothecium sessile, 2-4 mm. diameter, disk slightly concave or flat, dark brown; amphithecium crenulate, slightly lobed; K, none, C, none, K + C, none, P, none.

Algal layer continuous, 15-20  $\mu$  thick; upper cortex 15-16  $\mu$  thick, matrix yellow; medulla very loosely interwoven, hyphae large and of one type; lower cortex 15-18  $\mu$  thick; hypothecium 30-33  $\mu$  thick; ascus clavate, 8-spored, spores 3-4  $\times$  5-8  $\mu$ ; paraphyses branched and clubbed at the tip.



Distribution: Newfoundland to New York, west to Alberta and Washington.

NEWFOUNDLAND: on rock, Venison Trickle, Oct. 15, 1893, *Waghorne 17* (MBG); on cliff, Lark Harbor, Bay of Hand, Mar. 21, 1890, *Waghorne* (MBG); Sparrible Cove, Apr. 20, 1899, *Waghorne* (MBG).

MAINE: PISCATAQUIS CO.: on rocks, Mount Katahdin, July 1856, *Blake* (FM).

NEW HAMPSHIRE: COOS CO.: White Mountains, alpine region, 1863, *Mann* (FM); White Mountains, 1885, *Farlow 428* (F); Mount Moriah, Sept. 1885, *Farlow* (F); Mount Washington, Sept. 1894, *Farlow* (MBG,FM); on rocks, Mount Lafayette, *Hall 41* (FM).

VERMONT: LAMOILLE CO.: on ledges, The Nose, region of Mount Mansfield, June 24, 1922, *Merrill* (F).

NEW YORK: ESSEX CO.: on rocks, Mount Marey, near Lake Placid, elev. 5300 ft., Aug. 10, 1933, *Lowe 2601* (F).

ALBERTA: Mount Fairview, elev. 9000 ft., *Fink* (F).

MONTANA: FLATHEAD CO.: Columbia Falls, Apr. 25, 1893, *Williams* (US).

COLORADO: MONTROSE CO.: on rocks, elev. 5400 ft., *Naturita*, Oct. 1914, *Payson* (F); BOULDER CO.: on rocks, Mar. 1898, *Morgan* (F).

WASHINGTON: CLARKE CO.: on rocks of Pinnacle Peak, elev. 7200 ft., Sept. 8, 1909, *Foster 1055* (F).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Bartl. Dec. IV 7; Desm. ed. I, ser. I 1942, ed. II, ser. I 1592; E. Fries, 166, 307, 337; Funck, II 107; Gar. I 8; Harm. 67; Harm. Lich. Loth. 313; Hav. 182; Leight. 365; Malme, 66; Moug. et Nest. 315; Nyl. Lich. Mont. Dor. 29; Nyl. Pyr. 17; Stenh. 71; Tuck. 17.

The species is found only in the northern and alpine regions of the northern hemisphere. It grows only on rocks, and its small size and shining dark brown or black narrow lobes make it distinct in appearance from either *P. pubescens* or *P. proluxa*.

**8. *Parmelia proluxa* (Ach.) Röhl., Deut. Fl. 3, Abt. 2: 100. 1813.**

*Parmelia olivacea* var. *proluxa* Ach., Meth. Lich. 214. 1803.

Röhling's type is in Acharius' herbarium and is the plant used by Acharius as the type of his *Parmelia olivacea* var. *proluxa*. The type collection was made from a plant growing in the mountains of northern Europe.

Thallus small, loosely adnate; upper surface wrinkled and with coralloid branchlets, brown or blackish-brown, lobes short, much divided, imbricated and dissected, tips slightly inflated; under surface black with many short, black, flat rhizinae; apothecium sessile, 2-5 mm. diameter, disk flat or slightly concave, brown, margin crinkled, finely lobed; K, upper cortex yellow-green, medulla brown, C, none, K + C, none, P, none.



Algal layer continuous, 10–15  $\mu$  thick; upper cortex 21–22  $\mu$  thick; medulla loosely interwoven, hyphae large and of one type; lower cortex 20–22  $\mu$  thick; thallus 350–400  $\mu$  thick; thecium 60–64  $\mu$  thick; ascus clavate, 8-spored, spores spherical, 3  $\times$  3 or 4  $\times$  4  $\mu$ ; paraphyses branched.

Distribution: Labrador to West Virginia, west to Oregon.

LABRADOR: Packs Harbor, Hamilton Inlet, July 15, 1882, *Waghorne 13* (MBG, MIN).

NEWFOUNDLAND: on rock, sand beach, White Bay, Oct. 5, 1891, *Waghorne 355* (MIN); on rocks, Sparrible Cove, White Bay, Apr. 20, 1894, *Waghorne* (MIN).

NEW BRUNSWICK: on rocks, July 1879, *May* (FM).

MAINE: PISCATAQUIS CO.: on rocks in woods, side of Mount Katahdin, 1863, *Blake* (FM). KNOX CO.: Rockland, Sept. 20, 1915, *Merrill* (F).

NEW YORK: ESSEX CO.: on beech trees, elev. 1200 ft., June 20, 1905, *Merrill* (F).

WEST VIRGINIA: POCAHONTAS CO.: Dunmore, 1924, *Gray L309* (F).

MINNESOTA: LAKE CO.: on rocks, Snowbank Lake area, July 20, 1897, *Fink 832* (MIN); on rocks, Beaver Bay, July 13, 1897, *Fink 703* (MIN). CARLTON CO.: on rocks, Carlton Peak, July 10, 1897, *Fink 574* (MIN). KOOCHICHING CO.: on rocks, Gunflint, June 30, 1897, *Fink 290* (MIN). AITKIN CO.: on rocks, Palisades, July 15, 1897, *Fink 743* (MIN). RENVILLE CO.: on rocks, rare, Morton, July 7, 1899, *Fink 315* (MIN). YELLOW MEDICINE CO.: on wood, Granite Falls, July 11, 1899, *Fink 405* (MIN). PIPESTONE CO.: on pipestone, Pipestone, July 19, 1899, *Fink 643* (MIN). COUNTY UNKNOWN: on rocks, Blueberry Island, July 13, 1901, *Fink 575* (MIN); on rocks, South Fowl Lake, June 26, 1897, *Fink 197* (MIN); on rocks, Misquah Hills, June 5, 1897, *Fink 491* (MIN).

COLORADO: BOULDER CO.: on siliceous rocks, Longs Peak, Rocky Mountain National Park, elev. 12,600 ft., Sept. 17, 1933, *Kiener* (MBG).

WASHINGTON: CLALLAM CO.: on rocks, Sequim, 1916, *Grant* (F). ISLAND CO.: Whidbey Island, *Grant 3158* (F).

OREGON: COUNTY UNKNOWN: on trees, *Lloyd* (FM).

FOREIGN EXSICCATAE EXAMINED: *Claud. 261*; *Fl. Hung. 19*; *Hav. 444*; *Lojk. Hung. 119*; *Malme, 133*; *Meresch. 4*; *Moug. et Nest. 1428*; *Nyl. Pyr. 54*; *Roum. 186*; *Roum. Gen. 27*; *Zw. 569, 913*.

*Parmelia prolixa* (Ach.) Röhl. is found growing on stones and trees throughout most of the northern part of North America and Europe. It is distinguished from *Parmelia olivacea* (L.) Ach. by the dissected character of the lobes and the yellow-green reaction of the upper cortex when treated with K.

**9. *Parmelia olivacea* (L.) Ach., Meth. Lich. 213. 1803.**

*Lichen olivaceus* Linn., *Fl. Lap. 244. 1737*; *Sp. Pl. 1143. 1753.*

*Lobaria olivacea* Hoffm., *Deutschl. Fl. 2: 150. 1795.*



*Imbricaria olivacea* DC. apud Lam. & DC., Fl. Fr. 2: 393. 1815.

*Parmelia subolivacea* Nyl. apud Hasse, Bull. Torr. Bot. Club 24: 445. 1897.

The type of Linnaeus from the 'Flora Lapponica,' is unknown, but that from the 'Species Plantarum' is in his herbarium at London, England. Acharius' type is in his herbarium at Upsala, Sweden. Acharius cites as the same as his plant *t. 24, f. 77* of Dillenius, 'Historia Muscorum,' Hoffmann, 'Enumeratio Lichenum,' *t. 13, f. 3 & 4*, and Linnaeus' 'Species Plantarum,' 1143. Hoffmann's type is unknown but he cites as equal to his plant Linnaeus, 'Species Plantarum,' 1143, and Hoffmann, 'Enumeratio Lichenum,' *t. 13, f. 3 & 4*. DeCandolle considered his plant the same as Linnaeus' and Acharius' and he lists as a synonym the illustrations in Dillenius, 'Historia Muscorum' (*t. 24, f. 77*). Nylander's type of *P. subolivacea* is in the Nylander herbarium at Helsinki, Finland. The type collection of *P. subolivacea* was made by Dr. Hasse from rocks in the San Gabriel Mountains of California, and a co-type collection is in the United States National Herbarium at Washington, D. C.

The types of the European collectors came from the northern part of Europe. The species is distributed widely in the northern portions of both Europe and North America.

Thallus small to medium-sized, 3–10 cm. diameter, adnate to bark of trees; upper surface much wrinkled; cortex unbroken, olive-brown in color; apothecium sessile, 1–4 mm. diameter, disk concave, olive-brown, amphithecium slightly incurved, roughened with tiny lobules; K, none, C, none, K + C, none, P, yellow.

Algal layer continuous, 20–22  $\mu$  thick; upper cortex 18–21  $\mu$  thick, with yellow-brown matrix; medulla loosely interwoven with one type of hyphae; lower cortex 5–7  $\mu$  thick, with black matrix; thallus 144–150  $\mu$  thick; thecium 30–35  $\mu$  thick; ascus clavate, 8 spores to an ascus, spores 3–4  $\times$  5–6  $\mu$ ; paraphyses branched simply.

Distribution: Newfoundland to New York, west to California.



NEWFOUNDLAND: on rock, Sparribble Cove, Apr. 21, 1899, *Waghorne 81* (MBG); on trees, Capstan Island, Oct. 3, 1889, *Waghorne 203* (MIN); on bark, Chappel, Trinity Bay, July, 1883, *Waghorne 27* (MIN); on rocks, White Bay, May 10, 1891, *Waghorne* (MBG).

QUEBEC: on mountain ash, Lac Trois Saumons, May 13, 1936, *Lepage 303* (MBG); on Norway pine, Ste. Anne, Apr. 29, 1936, *Lepage* (MBG).

ONTARIO: on trees, islands in Lake Nipigon, July 11, 1884, *Macoun* (WIS); trees, Big Island, July 1894, *Millan & Sheldon 22458* (MIN); Collins Inlet, Algona District, Sept. 12, 1912, *Klugh* (F); on alder stem and fence rails in Ontario and on the former in British Columbia, 1878, *Macoun 24* (WIS,MBG).

MAINE: AROOSTOCK CO.: on cherry trees, St. Francis, Aug. 1893, *Cummings & Teller 26* (MBG,WIS,FM,F,MIN). KNOX CO.: on rocks, Rockport, May 7, 1910, *Merrill 136* (NYBG,MIN). CUMBERLAND CO.: Cumberland, 1863, *Blake* (FM).

NEW HAMPSHIRE: CARROLL CO.: Chocorua, Aug. 1911, *Farlow 478* (WIS); on trees, Chatham, July 1905, *Riddle* (F). COOS CO.: White Mountains, *Willey* (MIN). CHESHIRE CO.: Monadnoc, *Russell* (FM).

VERMONT: ADDISON CO.: on yellow birch, Goshen, elev. 1500 ft., Dec. 21, 1922, *Dutton* (MBG). ORLEANS CO.: Elephants Head, June 18, 1883, *Faxon* (WIS).

MASSACHUSETTS: BRISTOL CO.: trunks and rocks, common but infertile, New Bedford, *Willey 27* (FM). NORFOLK CO.: on smooth bark, Wellesley, Oct. 1907, *Riddle* (F).

NEW YORK: YATES CO.: Dundee, *Wright 11* (FM); Penn Yan, *Buckley* (MBG).

OHIO: ASHTABULA CO.: on rails and apple trees, Orwell, Apr. 27, 1895, *Bruge 863* (NYBG). ATHENS CO.: on oak, Sept. 22, 1935, *Wolfe 493* (O). FAIRFIELD CO.: on poplar, Sept. 22, 1935, *Wolfe* (NYBG). PIKE CO.: on linden, Sept. 15, 1935, *Wolfe 488* (O).

MICHIGAN: MACKINAC CO.: on beech, Mackinac Island, July 1899, *Harper* (F); on *Fagus ferruginea*, Mackinac Island, July 11, 1899, *Harper & Harper 68* (FM). KEWEENAW CO.: on birch, Rock Harbor, Isle Royale, Aug. 1904, *Harper & Harper* (FM); on *Populus*, Isle Royale, July 26, 1904, *Harper & Harper 169* (FM); on *Alnus*, Rock Harbor, Isle Royale, July 19, 1904, *Harper & Harper 176* (FM); Isle Royale, July 9, 1901, *Stuntz & Allen* (WIS). COUNTY UNKNOWN: Sailors Encampment, Aug. 3, 1897, *Harper & Harper* (FM).

WISCONSIN: ASHLAND CO.: on trees, Oak Island, July 10, 1901, *Fink* (MIN); VILAS CO.: valley of the Wisconsin River, near Lac Vieux Desert, Summer 1893, *Cheney 69* (WIS). BARRON CO.: Barron, Apr. 3, 1930, *Cheney 13022* (WIS). RACINE CO.: valley of the Wisconsin River near Lenwood Ferry, Summer 1894, *Cheney 3586* (WIS).

ILLINOIS: MENARD CO.: Athens, *Hall* (WIS,FM); limbs of *Quercus alba*, high up, Athens, Mar. 1862, *Hall* (FM). LA SALLE CO.: on trees, *Calkins* (FM).

MINNESOTA: COOK CO.: on alder, Grand Marais, July 22, 1902, *Fink 5160* (MIN); on balsam, Grand Marais, July 22, 1902, *Fink 5152* (MIN); on alder, Grand Marais, July 22, 1902, *Fink 5157* (MIN); on rocks along the lake, Grand Marais, Aug. 5, 1902, *Fink 5296* (MIN); on trees, Grand Portage, June 18, 1897, *Fink 11* (MIN). LAKE CO.: on trees, Beaver Bay, July 13, 1897, *Fink 712* (MIN); on trees, Snowbank Lake area, July 20, 1897, *Fink 848* (MIN). ST. LOUIS CO.: on bark, Vermilion Lake, Lat. 48°, July 20, 1886, *Arthur, Bailey & Holway 480* (MIN); on trees, Ely, July 28, 1897, *Fink 1004* (MIN); Tower, Aug. 20, 1901,



*Fink 1859* (MIN); Harding, Aug. 20, 1901, *Fink 1623* (MIN); on trees, Tower, Aug. 23, 1901, *Fink 1588* (MIN). CARLTON CO.: on trees, Tafte, Carlton Peak, June 10, 1897, *Fink 585* (MIN); on trees, Tafte, Carlton Peak, July 10, 1897, *Fink 591* (MIN); on rocks, Kettle Falls, Aug. 9, 1901, *Fink 1337* (MIN). KOOCHICHING CO.: on trees, Koochiching, July 25, 1901, *Fink 889* (MIN); on rocks, Rainy Lake City, Aug. 8, 1901, *Fink 1206* (MIN); Rainy Lake City, Aug. 8, 1901, *Fink 1281* (MIN); on trees, Rainy Lake City, Aug. 8, 1901, *Fink 1167* (MIN); on trees, Rainy Lake City, Aug. 30, 1901, *Fink 1162* (MIN). HENNEPIN CO.: on bark, Minnehaha, Apr. 1891, *Sheldon S4115* (MIN). BLUE EARTH CO.: on trees and old wood, Mankato, June 23, 1899, *Fink 61* (MIN). BELTRAMI CO.: on tamarack in swamp, frequent, Red Lake, July 30, 1900, *Fink 991* (MIN); on wood, Lake of the Woods, July 1896, *Millan 6* (MIN); on trees in tamarack swamp, frequent, Bemidji, July 7, 1900, *Fink 513* (MIN); on rocks, Bemidji, July 4, 1900, *Fink 446* (MIN); on rocks along the lake, Red Lake, Aug. 1, 1900, *Fink 1039* (MIN); on balsam in swamps, Beaudette, June 1, 1901, *Fink 56* (MIN); on oaks, frequent, Bemidji, July 4, 1900, *Fink 443* (MIN). OTTERTAIL CO.: on trees, Leaf Hills, June 26, 1900, *Fink 243* (MIN); Battle Lake, June 19, 1900, *Fink 31* (MIN). YELLOW MEDICINE CO.: on trees, Granite Falls, July 15, 1899, *Fink 537* (MIN). ROSEAU CO.: on trees, Warroad, June 25, 1901, *Fink 141* (MIN). PENNINGTON CO.: on trees, Thief River Falls, July 20, 1900, *Fink 830* (MIN).

IOWA: FAYETTE CO.: on trees, Aug. 1893, *Fink* (WIS); on trees, Aug. 1898, *Fink* (MIN); on trees, 1896, *Fink* (MBG).

ALBERTA: on *Salix*, Banff, *Sanson* (F).

MONTANA: YELLOWSTONE CO.: bark of live *Alnus tenuifolia*, Buffalo Creek, Helena National Forest, Sept. 10, 1931, *Flint* (MONT); bark of Douglas fir and on dead *Salix*, Bear Gulch, Helena National Forest, S.20. T.7. N. R 4 E., July 28, 1931, *Flint* (MONT). COUNTY UNKNOWN: on alder, Lower Pattee Canyon, Jan. 15, 1934, *Flint* (MONT).

WYOMING: ALBANY CO.: Sheep Mountain, July 3, 1897, *A. Nelson* (MBG). NATRONA CO.: Willow Creek, May 22, 1897, *E. Nelson* (MBG).

NEW MEXICO: SOCORRO CO.: shade, San Andres Mountains, Rhodes Pass, 47 miles west of Tularosa, June 6, 1938, *Hubricht B999* (MBG). VALENCIA CO.: shade, 7 miles north of Trechado, June 9, 1938, *Hubricht B1069* (MBG); open woods, 16 miles south of El Morro, June 10, 1938, *Hubricht B1105* (MBG). MCKINLEY CO.: pine-juniper forest, 22 miles south of Gallup, June 11, 1938, *Hubricht B1140* (MBG).

BRITISH COLUMBIA: on bark of tree, June 1915, *Macoun 15* (F); Lilloet, July 1915, *Macoun 456* (F).

WASHINGTON: PIERCE CO.: on alder, Longmires Springs, Aug. 1906, *Harper & Harper* (FM). ISLAND CO.: on *Alnus*, 1923, Langley, *Grant* (WIS). WHITMAN CO.: on lower dead branches of yellow pines, along Palouse River near Palouse, Aug. 12, 1938, *Ownbey & Ownbey* (MBG).

OREGON: COUNTY UNKNOWN: on *Alnus oregona*, 1921, *Grant* (FM).

CALIFORNIA: SAN BERNARDINO CO.: on oaks, Wildwood Canyon above Yucaipa Valley, Mar. 24, 1936, *Reed* (MBG); on oak, San Bernardino Range, July 1895, *Hasse* (FM). RIVERSIDE CO.: on oaks, San Jacinto Mountains, elev. 1600 ft., 1903, *Hasse 103* (MIN). MONTEREY CO.: on rock, Dells Camp, San Antonio Canyon, 1894, *Hasse* (F). MARIPOSA CO.: on rocks, Yosemite, May 11, 1896, *Cummings* (WIS).



SAN JOAQUIN CO.: on mossy sandstone, Castle Rock, elev. 3000 ft., June 16, 1906, *Herre* 744 (MIN); on sandstone, Castle Rock, elev. 3000 ft., Dec. 3, 1904, *Herre* (MBG); on sandstone, Castle Rock, elev. 3000 ft., June 10, 1906, *Herre* (MBG). BUTTE CO.: hills 4 miles east of Chico, on *Quercus Douglasii*, Jan. 28, 1914, *Heller* 11160 (MIN,MBG). SANTA CLARA CO.: on *Quercus Wislizenii*, Black Mountain, elev. 1600 ft., *Herre* (MBG). COUNTY UNKNOWN: on oaks, Ano Nuevo Creek, elev. 100 ft., Aug. 9, 1906, *Herre* (MIN).

**9a. *Parmelia olivacea* var. *aspidota* Ach., Meth. Lich. 214. 1803.**

*Lichen aspidotus* Hoffm., Enum. Lich., t. 13, f. 5. 1784.

*Parmelia aspidota* Röhl., Deut. Fl. 3, Abt. 2: 100. 1813.

Acharius' type of the variety is no longer in existence, but he cites Hoffmann, 'Enum. Lich.,' t. 13, f. 5. 1784, and Dillenius, 'Historia Muscorum,' t. 24, f. 78. 1741. Röhling cites as the type of his plant, Acharius, Meth. Lich. 214. 1803.

The variety is widely distributed in the northern portions of the temperate zones. It is distinguished from the species by the abundant covering of granules and coralloid branchlets on the upper surface of the thallus and the margin of the apothecium. Thalloid characters of such a nature do not merit the rank of species.

Distribution: Newfoundland to North Carolina, west to New Mexico.

NEWFOUNDLAND: sandstone, White Bay, May 10, 1891, *Waghorne* (MBG); Trinity Bay, Mar. 21, 1883, *Waghorne* (MBG).

NEW BRUNSWICK: bark of trees, 1871, *Fowler* (FM).

ONTARIO: on trees, islands in Lake Michigan, July 11, 1884, *Macoun* (MBG); on cedars in swamp, Emo, July 17, 1901, *Fink* 667 (MIN).

VERMONT: COUNTY UNKNOWN: *Pringle* (BSNH).

MASSACHUSETTS: COUNTY UNKNOWN: Crawford Path, June 5, 1882, *Faxon* (F).

NEW YORK: YATES CO.: Penn Yan, *Buckley* (MBG).

NORTH CAROLINA: COUNTY INDEFINITE: on trees, mountains of North Carolina, *Calkins* 377 (FM).

OHIO: COUNTY UNKNOWN: on bark of tree, *Bogue* (FM).

MICHIGAN: WASHTENAW CO.: on aspen, Whitmore Lake, May 16, 1931, *Lowe* (M). ALCONA CO.: on aspen, Mud Lake Bog, May 16, 1931, *Lowe* (M).

WISCONSIN: WAUSHARA CO.: west of Coloma, Oct. 13, 1935, *J. Thomson* (WIS). LAFAYETTE CO.: Fayette, July 15, 1894, *Cheney* 9206 (WIS).

ILLINOIS: MENARD CO.: high up in hickory trees, 1878, *Hall* (FM,MBG,BSNH).

MINNESOTA: BELTRAMI CO.: on trees, Bemidji, July 12, 1900, *Fink* 672 (MIN).

OTTERTAIL CO.: on trees, Leaf Hills, July 2, 1900, *Fink* 385 (MIN). PIPESTONE CO.: on quartzite, Pipestone, July 18, 1899, *Fink* 621 (MIN). COUNTY UNKNOWN: Oak Island, July 9, 1901, *Fink* 464 (MIN).



IOWA: FAYETTE CO.: on trees, 1896, *Fink* (MBG,F,WIS,MIN).

MONTANA: CASCADE CO.: Great Falls, Mar. 31, 1888, *Williams 25* (MIN).

COLORADO: EL PASO CO.: on live elm, Palmer Lake, June 20, 1928, *Laidig* (F).

NEW MEXICO: SAN MIGUEL CO.: on trees, Las Vegas, Feb. 18, 1926, *Bro. Anect* (M).

**9b. *Parmelia olivacea* var. *glabra*** (Schaer.) Linds., *Trans. Roy. Soc. Edinb.* **12**: 236. 1859.

*Parmelia olivacea*\* *corticola* var. *glabra* Schaer., *Lich. Helv. Spic. sect. 10*: 466. 1840.

Both Schaerer and Lindsay considered Schaerer's 'Lich. Helv. Exs.' 370, the type of this variety. The variety differs from the species only in that the medulla becomes red with  $\text{CaOCl}_2$ .

Distribution: North American collections of the plant have been seen from only a few localities in southern California.

CALIFORNIA: SAN BERNARDINO CO.: on oaks, elev. 1600 ft., June 1899, *Hasse 265* (F); on mossy sandstone, elev. 3000 ft., Castle Rock, June 16, 1906, *Herre* (F,MBG).  
LOS ANGELES CO.: on rocks, Camp Baldy, elev. 4700 ft., *Hasse* (F).

**10. *Parmelia multispora*** Schneid., *Guide to Study of Lichens*, 154. 1898.

*Parmelia olivacea* var. *multispora* Merrill, *Bryol.* **12**: 73. 1909.

*Parmelia olivacea* var. *polyspora* Herre, *Proc. Wash. Acad. Sci.* **12**: 199. 1910.

Schneider's type is a plant collected in the mountains east of San Francisco in California, and is now in the United States National Herbarium. Merrill's type is in his herbarium at Harvard University, and is probably co-type material from Schneider. Herre's type is number 426 in the Lichen Herbarium at Leland Stanford University.

Thallus small, 3-7 cm. diameter, adnate, lobes wide and short, little-branched, margins smooth; upper surface smooth or slightly wrinkled, olive-brown or almost black; under surface brown and smooth at the margins, black at the center, with numerous short black rhizinae; apothecia numerous, sessile, 1-8 mm. diameter, disks flat to slightly concave, chestnut-brown or darker, amphithecia thin, smooth; K, none, C, none, K + C, none, P, none.



Algal layer continuous, 4–8  $\mu$  thick; upper cortex 8–10  $\mu$  thick, matrix brown; medulla loosely interwoven; lower cortex 12–16  $\mu$  thick, matrix black; thickness of thallus 48–120  $\mu$ ; thecium 60–65  $\mu$  thick, ascus clavate, spores 16 to many, spherical, 1–4  $\mu$  diameter; paraphyses branched, enlarged at the tips.

Distribution: Idaho, west to British Columbia, south to California.

IDAHO: BONNER CO.: on *Salix*, Cooling, Sept. 18, 1919, *Weir* (F).

BRITISH COLUMBIA: trunks of trees, Sidney, Vancouver Island, 1912, *Macoun* (F).

WASHINGTON: KLUCKITAT CO.: on oaks, Goldendale, Oct. 16–23, 1919, *Foster* (F). SPOKANE CO.: on alders, Dead Man Creek, *Bowser* (F).

OREGON: MARION CO.: Salem, 1871, *Hall* (FM).

CALIFORNIA: LOS ANGELES CO.: San Gabriel Mountains, 1906, *Hasse* (F); on oak, Garapito Canyon, Santa Monica Mountains, Sept. 1, 1920, *Moxley 802* (BPI). MARIPOSA CO.: on oak, Yosemite Valley, 1900, *Riddle* (F). SANTA CLARA CO.: on oak, Black Mountain, Santa Cruz Mountains, Apr. 30, 1904, *Herre* (BPI, MIN); on *Quercus Wislizenii*, Black Mountain, Santa Clara Mountains, elev. 1600 ft., Apr. 30, 1904, *Herre 426* (Type of variety) (LSU).

**11. *Parmelia conspurcata*** (Schaer.) Wainio, Meddel. Soc. Fauna & Fl. Fenn. **24**: 22. 1888.

*Parmelia olivacea* var. *corticola* f. *conspurcata* Schaer., Lich. Helv. Spic., sect. 10: 466. 1840.

Schaerer took as the type of the form of his variety, Lich. Helv. Exs. 371, which was collected in the Swiss Alps. Wainio, using the same type, raised the form to the rank of a species.

Thallus small to large, 2–10 cm. diameter, loosely adnate, gray to olive-brown or greenish-gray; upper surface wrinkled, covered with small soredia, margin crinkled, slightly sorediate, lobes round, short, slightly and irregularly dissected; lower surface brown to black, with few black rhizinae; apothecium, sessile, 4–7 mm. diameter, margin slightly lobed and sorediate, disk concave, chestnut-brown; K, greenish-yellow then brown, C, none, K + C, red, P, none.

Algal layer continuous, 12–15  $\mu$  thick; upper cortex 15–16  $\mu$  thick, matrix yellow; medulla loosely interwoven, hyphae of one type; lower cortex 15–20  $\mu$  thick, matrix brown or black; thecium 36–45  $\mu$  thick; ascus clavate, spores 5–7  $\times$  10–14  $\mu$ , hyaline; paraphyses branched and knobbed at the tip.



Distribution: Alberta to British Columbia, south to California.

ALBERTA: on white spruce, Banff, Oct. 1, 1910, *Sanson 323* (F).

BRITISH COLUMBIA: "Biglon Bay," New Denver, Dec. 25, 1920, *MacFadden 127* (BPI).

CALIFORNIA: SAN MATEO CO.: on sandstone, elev. 1900 ft., Bear Gulch road, Santa Cruz Mountains, May 12, 1904, *Herre 488* (F,MBG,MIN); on rocks and mosses, elev. 1000-1300 ft., San Bruno Mountain, July 13, 1906, *Herre 835* (MBG,MIN).

**12. *Parmelia exasperata*** (Ach.) DeNot., *Giorn. Bot. Ital.*, 2: 193. 1847.

*Collema exasperatum* Ach., *Lichenogr. Univ.* 645. 1810.

Acharius' type was from the Valley of St. Nicolai in Switzerland. DeNotaris, using material determined by Acharius, placed the species in the genus *Parmelia*.

Thallus small, 3-8 cm. diameter, adnate on stone or wood, wrinkled, smooth and shining or granular, lobes long, narrow, tips rounded, tightly appressed, imbricated, olive-brown to olivaceous-black; K, none, C, none, K + C, none, P, none.

Algal layer continuous, 70-75  $\mu$  thick; upper cortex 15-20  $\mu$  thick; medulla loosely interwoven, hyphae of one type; lower cortex 15-20  $\mu$  thick, matrix brown; thickness of thallus 180-200  $\mu$ ; thecium 30-35  $\mu$  thick; ascus clavate, spores 8, 2-3  $\times$  4-6  $\mu$ ; paraphyses branched.

Distribution: Maine to West Virginia, west to California.

MAINE: KNOX CO.: on trunks of trees, Camden, Sept. 1904, *Merrill* (F).

NEW HAMPSHIRE: MERRIMACK CO.: on old fence, North Sutton, July 1914, *Riddle 1427* (F).

WEST VIRGINIA: POCAHONTAS CO.: Wanless, Jan. 1923, *Gray L231* (F).

OHIO: WAYNE CO.: on *Pyrus Malus*, Wayne, Apr. 2, 1895, *Bogue 778* (NYBG).

MICHIGAN: CHEBOYGAN CO.: vicinity of Burt and Douglas lakes, June-Aug. 1911, *Leeson* (F).

CALIFORNIA: COUNTY INDEFINITE: on *Quercus*, Tehachapi Mountains, June 1907, *Hasse* (BPI). MARIPOSA CO.: on tree, Yosemite Valley, 1900, *Hasse* (F). SANTA CLARA CO.: on rocks, hills near Stanford, elev. 150 ft., Apr. 9, 1904, *Herre* (MBG).

## II. XANTHOPARMELIA

*Parmelia* subgenus **Euparmelia** sect. **II. Xanthoparmelia**  
Zahl. apud Engler & Prantl, *Nat. Pflanzenfam. I Teil, Abt. 1:*  
212. 1907.



*Parmelia* sect. *Xanthoparmelia* Wainio, Étude Lich. Brésil 1: 60. 1890.

Wainio considered *Parmelia endoleuca* Taylor as the type of the section *Xanthoparmelia*. Zahlbruckner considered *Parmelia conspersa* (Ehrh.) Ach. as the type for section *Xanthoparmelia* of *Euparmelia*.

Thallus small, lobes narrow and imbricated; lower surface with small rhizinae, apothecia sessile.

KEY TO SPECIES IN EUPARMELIA SECT. XANTHOPARMELIA

- A. Thallus light-colored below.
  - B. Lobes wider than long; spores spherical,  $4 \times 4.5-5 \times 5 \mu$  . . . 16. *sphaerosporella*
  - B. Lobes longer than wide.
    - C. Spores  $7-10 \times 9-12 \mu$  . . . 19. *leucochlora*
    - C. Spores  $3-4 \times 5-7 \mu$  . . . 14. *centrifuga*
- A. Thallus always dark below.
  - B. Never with soredia, isidia, or coralloid branchlets.
    - C. Never on soil.
      - D. Upper surface always smooth, uncracked; spores  $4-6 \times 7-9 \mu$  . . . . . 17. *conspersa*
      - D. Upper surface always cracked; spores  $7-10 \times 12-16 \mu$  . . . . . 18. *lineola*
    - C. Always on soil, often drifted into piles by the wind . . . . . 15. *chlorochroa*
  - B. Always with soredia, isidia, or coralloid branchlets.
    - C. With isidia or coralloid branchlets; K, yellow . . . 17a. *conspersa* var. *isidiata*
    - C. With yellow globose powdery soredia; K, brown . . . . . 13. *incurva*

**13. *Parmelia incurva*** (Pers.) Fries, Nova Sched. Crit. 31. 1826.

*Lichen incurvus* Pers., Neue Ann. d. Bot. 7: 24. 1794.

*Lobaria incurva* Hoffm., Deutschl. Fl. 2: 156. 1795.

*Imbricaria incurvus* Ach., Lichenogr. Suec. Prodr. 107. 1798.

Persoon's type is unknown, but probably came from near Leyden, as the plant has a wide distribution throughout Europe. Hoffmann cites *Lichen incurvus* Pers. as synonymous with his *Lobaria incurva*. Acharius' *Imbricaria incurvus* was described from material collected in the mountains of Europe. He cites Persoon's *Lichen incurvus* and Hoffmann's *Lobaria incurva* as being synonymous with his plant. Fries cites all three of the previous treatments in transferring the species to the genus *Parmelia*.

Thallus small, 5-15 cm. diameter, adnate on stones, margins



yellowish-green with center dark greenish-gray, lobes long and very narrow, imbricated, the tips appressed; cortex smooth except for scattered, globular, powdery, yellow soredia; under-surface dark brown with short, thick, black rhizinae evenly distributed, the tips of which are fused into a continuous layer of some extent; apothecium sessile, 3–10 mm. diameter, margin smooth and entire, disk concave to flat, chestnut-brown; K, upper cortex black, medulla brown, C, none, K + C, none, P, none.

Algal layer discontinuous, gonidia in clumps 60–75  $\mu$  in diameter; upper cortex 60–75  $\mu$  thick, matrix brown; lower cortex 60–70  $\mu$  thick, matrix black; medullary hyphae loosely interwoven, hyphae all of one type, 1–2  $\mu$  in diameter; thickness of thallus 1000–1017  $\mu$ ; thecium 55–65  $\mu$  thick; ascus short-cylindrical, spores 8, 5–6  $\times$  8–14  $\mu$ ; paraphyses branched once or twice.

Distribution: Newfoundland to New Hampshire and Vermont.

NEWFOUNDLAND: on rock, Chance Cove, Trinity Bay, 1882, *Waghorne* (MBG); on rocks, east coast, July 20, 1891, *Waghorne 36* (MIN).

MAINE: KNOX CO.: on quartzite rocks, elev. 900 ft., Camden, Aug. 22, 1909, *Merrill 75* (MIN).

NEW HAMPSHIRE: COOS CO.: on rocks, White Mountains, 1854, *Tuckerman* (T).

VERMONT: WINDSOR CO.: table rock, Mount Horrid, Rochester, elev. 2500 ft., Sept. 17, 1902, *Dutton 1415* (FM).

FOREIGN AND LOCAL EXSICCATAE EXAMINED: E. Fries, 260; Harm. 69; Harm. Lich. Loth. 278; Hav. 78, 314, 390; Malme, 178; Merr. 75; Norrl. et Nyl. 27; Roum. 433; Salw. 237; Stenh. 123; Tuck. 76.

**14. *Parmelia centrifuga* (L).** Ach., Meth. Lich. 206. 1803.

*Lichen centrifugus* Linn., Sp. Pl. 1142. 1753.

*Imbricaria centrifuga* Ach., Lichenogr. Suec. Prodr. 118. 1798.

Linnaeus based his *Lichen centrifugus* on European material in his herbarium. Acharius says that he saw the Linnaean plants and considered them the same as his *Parmelia centrifuga*.

Thallus small, light yellow-green above, orbicular, closely adnate to rocks; upper cortex free from isidia or soredia, margins always smooth, lobes dichotomously branched, narrow,



with rounded closely appressed tips; lower surface light-colored with numerous, small, light-brown rhizinae evenly distributed; apothecium sessile, 2–7 mm. diameter, disk convex, chestnut-brown, margin somewhat incurved and smooth; K, upper cortex lemon-yellow, medulla yellow, C, none, K + C, yellow, P, none.

Algal layer continuous, immediately beneath the upper cortex, 35  $\mu$  thick; medulla of loosely interwoven hyphae 1  $\mu$  or less in diameter, with no differentiation into a medullary strand or central cavity; upper cortex 14  $\mu$  thick with vertically extending hyphae surrounded by a yellowish-green matrix; lower cortex 28  $\mu$  thick, composed of vertically interwoven hyphae with a black matrix; thecium 33–35  $\mu$  thick; ascus pyriform, spores 8, 3–4  $\times$  5–7  $\mu$ , arranged irregularly; paraphyses branched, tips slightly enlarged.

Distribution: Labrador to Tennessee, west to Alaska and British Columbia.

LABRADOR: on boulders and other rocks, Aug. 27, 1896, *Low* (F); rocks, coast of north Labrador, Aug. 23, 1896, *Low* (F).

NEWFOUNDLAND: on rocks, White Bay, Oct. 1, 1891, *Waghorne 359* (MIN); on rocks, Harbor Deep, White Bay, Nov. 1, 1891, *Waghorne* (MBG); on rocks, Tanners Head, Mar. 4, 1892, *Waghorne* (MBG); on rocks, Corke Rock, July 12, 1893, *Waghorne* (MBG).

NEW BRUNSWICK: on rocks, Lobewue River, July 1884, *Hay* (F).

QUEBEC: on rocks, Ste. Anne, Apr. 23, 1935, *Lepage 146* (D); among dry granite rocks at 1200 m., northeast summit of Mount Dunraven, Tabletop Mountains, Aug. 1, 1923, *Fernald, Dodge & Smith* (D); on rocks at Rimouski, May 22, 1937, *Lepage 512* (D).

MAINE: PENOBSCOT CO.: on rocks, New Port, July 27, 1922, *Plitt* (BPI). KNOX CO.: on quartz, Camden, elev. 900 ft., Aug. 22, 1909, *Merrill 75* (F); on ledges at 900 ft. elev., Camden, Aug. 24, 1909, *Merrill 96* (MIN).

NEW HAMPSHIRE: COOS CO.: Gate of Notch, June 16, 1883, *Faxon* (WIS); alpine regions, White Mountains, 1863, *Mann* (FM); Mount Washington, July 1884, *Faxon* (FM); White Mountains, Sept. 1909, *Farlow 430* (F); White Mountains, *Willey 46* (MIN). GRAFTON CO.: summits of Mounts Lincoln and Lafayette, Franconia Mountains, Aug. 15, 1892, *Cummings & Heller 107* (MBG, WIS, FM).

VERMONT: LAMOILLE CO.: ledges, the Chin, Mount Mansfield, elev. 5000 ft., June 20–24, 1922, *Dutton* (MBG).

NEW YORK: ESSEX CO.: on rocks, Mount Marcy, near Lake Placid, 5000 ft., Aug. 16, 1934, *Lowe 4197* (NYBG).

PENNSYLVANIA: LANCASTER CO.: on rocks, Bear Town, July 11, 1894, *Eby* (MBG).

TENNESSEE: HAMILTON CO.: on rocks, Lookout Mountain, *Calkins 7* (F).



MINNESOTA: ST. LOUIS CO.: on rocks, Misquah Hills, July 5, 1897, *Fink 496a* (MIN).

COLORADO: CLEAR CREEK CO.: above Bear Creek, elev. 12,000 ft., July 6, 1896, *Pammel* (MBG).

ALASKA: Arakamlehetchene Island, Behring Strait, *Wright* (F).

YUKON: on rocks, Bonanza Creek, July 18, 1902, *Macoun 24* (F).

BRITISH COLUMBIA: on rocks, back of Glain House, elev. 4450 ft., Aug. 6-7, 1906, *Fink 5866* (M).

FOREIGN AND LOCAL EXSICCATAE EXAMINED: Cum. I. 107; Elenk. 102a, b; Fellm. 80; E. Fries, 48; Th. Fries, 6; Howe, 28; Lojk. Univ. 158; Malme, 67; Meresch. 54; Merr. 96; Norrl. et Nyl. 202; Rab. 471; Stenh. 125; Tuck. 78; Zw. 450.

**15. *Parmelia chlorochroa* Tuck., Proc. Amer. Acad. Arts & Sci. 4: 383. 1860.**

Tuckerman's type was collected on the upper Missouri River near the mouth of the Cannon Ball River by Hayden. This plant is now in Tuckerman's herbarium, at Harvard University.

Thallus small, 2-4 cm. diameter, growing on arid soil, loose and easily blown about by the wind, lobes long, narrow, repeatedly dichotomously branched, somewhat imbricate, convex, whitish-gray to yellowish-gray; under surface dark brown or black with small black rhizinae evenly distributed; apothecia rare, sessile, 2-6 mm. diameter, disks concave to flat, dark brown, amphithecia smooth or crenulate, slightly incurved at the margin; K, upper cortex yellow, medulla none, C, none in either the upper cortex or medulla, K + C, medulla brown, P, yellow.

Algal layer discontinuous, in groups of cells which are 25-40  $\mu$  in diameter; upper cortex 28-30  $\mu$  thick; medulla of loosely interwoven hyaline hyphae; lower cortex 20-25  $\mu$  thick; thallus 266-506  $\mu$  thick; thecium 48-60  $\mu$  thick; ascus clavate, spores 8, 3-4  $\times$  6-8  $\mu$ ; paraphyses thin, branched.

Distribution: North Dakota to Nebraska, west to Saskatchewan and New Mexico.

NORTH DAKOTA: MORTON CO.: on ground, abundant on right side of Missouri River near Cannon Ball River, *Hayden* (Type Collection) (F).

SOUTH DAKOTA: PENNINGTON CO.: Black Hills, Upper Pole Creek, Aug. 1856, *Engelmann* (MBG); on dry earth among rocks, Dakota, 1907, *Skinner* (MIN); on eroded clay soil, Rapid City, Mar. 20, 1927, *McIntosh* (M,F). WASHINGTON CO.: abundant on dry soil, Indian Draw, July 18, 1911, *Fisher 2127* (FM).



NEBRASKA: SIOUX CO.: on dry calcareous soil near War Bonnet Canyon, June 20, 1890, *Williams 106* (F,MBG,FM,MIN).

SASKATCHEWAN: on earth, Old Wives Creek, May 25, 1895, *Macoun* (MBG).

MONTANA: CASCADE CO.: on soil, slightly northwest, Great Falls, Mar. 22, 1932, *Flint* (MONT). LEWIS AND CLARK CO.: on soil, very abundant on windswept site, bluffs, east shore of Lake Sewell, Helena, elev. 4000 ft., Oct. 1931, *Flint* (MONT). BEAVERHEAD CO.: growing on dry gravelly soil in sagebrush near Bannack, June 1926, *Flint* (MONT).

WYOMING: ALBANY CO.: Laramie, July 23, *A. Nelson* (MBG); hills 6 or 7 miles east of Laramie, Nov. 15, 1936, *G. Ownbey* (MBG). JOHNSON CO.: on the floor of the Devil's Kitchen, Powder River, June 27, 1910, *A. Nelson* (MBG). CARBON CO.: gravelly hills on the ground, 60 miles from foothills, *Hall* (FM); full sun, 1 mile north of Bairoil P.O., June 30, 1938, *Hubricht B1304* (MBG). WASHAKIE CO.: in crevices of boulders, Soldiers Park, North Fork of Clear Creek, Big Horn Mountains, Aug. 19, 1898, *Williams* (MBG). FREMONT CO.: Wind River Mountains, 1860, *Hayden* (T). LINCOLN CO.: on earth, Gros Ventre Canyon, July 19, 1939, *Andrews* (MBG). CONVERSE CO.: full sun, 7 miles northeast of Orin, July 1, 1938, *Hubricht B1314* (MBG).

COLORADO: CLEAR CREEK CO.: Rocky Mountains, *Hall* (T); Empire, July 1895, *Bethel* (W). GUNNISON CO.: Rogers Bridge, 1878, *Brandegge* (F). PARK CO.: on earth, South Park, 1873, *Wolf* (FM). CHAFFEE CO.: Mount Garfield, elev. 3700 m. Sept. 8, 1901, *Clements & Clements* (NYBG). JACKSON CO.: Black Water of the Platte, *Engelmann* (T). ROUTT CO.: on earth, Mount Meadow, *Calkins 343* (FM).

NEW MEXICO: VALENCIA CO.: full sun, on ground, 16 miles south of El Morro, June 10, 1938, *Hubricht B1107* (MBG); full sun, on ground, 7 miles north of Trechado, June 9, 1938, *Hubricht B1085* (MBG). CATRON CO.: full sun, on ground, 11 miles north of Pie Town, June 9, 1938, *Hubricht B1064* (MBG).

LOCAL EXSICCATAE EXAMINED: Merr. 237; Cum. I 106, II 27.

*Parmelia chlorochroa* Tuck. is endemic in the Rocky Mountains and Great Basin region of North America. In the literature and herbaria it has been confused with *Parmelia molliuscula* Ach. and *vagans* Nyl. Acharius' *Parmelia molliuscula* was named from a sterile collection made by Thunberg on Table Mountain, South Africa. Nylander discusses collections from Siberia, Peru, and North America as representing *Parmelia vagans*; these are not the same as Tuckerman's *Parmelia chlorochroa*.

**16. *Parmelia sphaerosporella* Müll.-Arg., Flora 74: 378. 1891.**

The type was collected by Dr. Lyall in the Galton Mountains of British Columbia, and sent to the Kew Herbarium as the Plants of the Oregon Boundary Commission.



Thallus small, 4–8 cm. diameter, adnate to substratum; upper surface much wrinkled but not broken, margins appressed, round, smooth, lobes short and wide, not branched, upper surface golden-yellow, medulla white; lower surface light (white or yellow with many thick, light-colored rhizinae); lower cortex much wrinkled but not cracked or broken; apothecia numerous, 1–6 mm. diameter, sessile, concave, light-brown; margin of amphithecium thin, smooth, and unbroken; K, none, C, none, K + C, none, P, red-brown.

Algal layer continuous, 25–35  $\mu$  thick; upper cortex 20–25  $\mu$  thick; medulla very loosely interwoven, hyphae hyaline, rough and of one type, 4–6  $\mu$  in diameter; lower cortex 20–25  $\mu$  thick, matrix light-colored or hyaline; thickness of thallus very variable, 400–1000  $\mu$ ; thecium 60–64  $\mu$  thick, hypothecium hyaline, 48–60  $\mu$  thick; algal layer continuous under the thecium; ascus cylindrical or slightly clavate, spores 8, spherical,  $4 \times 4.5\text{--}5 \times 5$   $\mu$ ; paraphyses branched and enlarged at the tips.

Distribution: Ontario and British Columbia.

ONTARIO: on trees, Emo, July 18, 1901, *Fink 684* (MIN).

BRITISH COLUMBIA: Galton Mountains, Oregon Boundary Commission, 1861, *Lyall* (Co-type collection) (F,LSU).

**17. *Parmelia conspersa*** (Ehrh.) Ach., *Meth. Lich.* 205. 1803.  
*Lichen conspersus* Ehrh. in litt. apud Ach., *Lichenogr. Suec. Prodr.* 118. 1798.

*Imbricaria conspersa* Ach., *Lichenogr. Suec. Prodr.* 118. 1798.

Ehrhart based his description on the plants in the Linnean Herbarium. Acharius cites Ehrhart's plant as synonymous with his *Imbricaria conspersa* and *Parmelia conspersa*. Hoffmann's use of *L. centrifugus* to designate the plant is non valid, as *centrifuga* had already been applied to another plant of the group.

Thallus large, wide-spread, adnate to substratum; upper surface smooth, without cracks, isidia or soredia, margins always smooth, bright green to yellowish-brown; lobes short, with margins much but not deeply dissected, either dichotomously or irregularly branched, arising from the center of the



thallus and growing out over the lower thallus, often forming several layers; lower surface black or brown, much wrinkled, lower cortex continuous, rhizinae evenly distributed, but papillose; apothecium sessile, 1–5 mm. diameter, concave, disk chestnut-brown; amphithecium slightly incurved, with few vertical fissures on the margin; K, yellow, C, none, K + C, none, P, red-brown.

Algal layer continuous with slight lobing at the lower side, 35–50  $\mu$  thick; upper cortex of vertical hyphae with a dark matrix, 6.5–7  $\mu$  thick; thallus 133–171  $\mu$  thick; lower cortex 36–60  $\mu$  thick; medullary hyphae loosely interwoven, with no suggestion of a central strand or central cavity, two types of medullary hyphae, the common type small, less than 1  $\mu$  in diameter and hyaline, and a few scattered dark hyphae 2–3  $\mu$  in diameter; thecium 100–125  $\mu$  thick; ascus clavate, spores 8, 4–6  $\times$  7–9  $\mu$ ; paraphyses branched and slightly flattened at the tips.

Distribution: Newfoundland to Alabama, west to Washington and California.

NEWFOUNDLAND: on sea cliff, Half-way Point, Bay of Hand, Apr. 29, 1897, *Waghorne 315* (MIN); on rocks, Jan. 3, 1899, *Waghorne* (MBG).

NEW BRUNSWICK: Grand Hirman, July 1879, *May* (FM); Owen Sound, *Hall* (FM).

QUEBEC: on rock, Ste. Anne, May 5, 1935, *Lepage 148* (D); on boulder, Ste. Anne, May 5, 1935, *Lepage 47* (D).

ONTARIO: on boulders in woods and open places, Ottawa, Oct. 16, 1892, *Macoun 155* (WIS,MBG); on boulders in pastures, Apr. 27, 1903, *Merrill* (MBG); on rocks, Algonquin Park, July 12, 1900, *Macoun 247* (MBG); on rocks, Emo, July 22, 1901, *Fink 814* (MIN).

MAINE: CUMBERLAND CO.: on rock and stones, Cumberland, Nov. 30, 1855, *Blake* (FM). HANCOCK CO.: Mount Desert Island, July 25, 1928, *Plitt* (BPI); Mount Desert Island, Middle Triad Summit, Sept. 1894, *Rand* (D).

NEW HAMPSHIRE: COOS CO.: Mount Shelburne, Cabot, June 9, 1844, *Schrenk* (MBG). CHESHIRE CO.: on shaded rock, Jaffrey, Aug. 1916, *Riddle* (F).

VERMONT: ADDISON CO.: cedar trees in swamp, Leicester, Feb. 11, 1910, *Dutton 337* (FM); on huge boulder, Middlebury, Apr. 26, 1913, *Dodge 155* (D); on quartz, Middlebury, May 10, 1913, *Dodge 148* (D). RUTLAND CO.: on wood-shingled roof, Brandon, Sept. 14, 1910, *Dutton 471* (FM).

MASSACHUSETTS: ESSEX CO.: on rock, Annisquam, Apr. 2, 1892, *Cummings* (MBG,MIN,WIS,FM); Marblehead, July 12, 1895, *Harper & Harper 36* (FM). MIDDLESEX CO.: Concord, 1863, *Mann* (FM); on rocks, Arlington, Apr. 15, 1895, *Fink* (MBG). SUFFOLK CO.: near Boston, *Faxon* (WIS). NORFOLK CO.: Wellesley, Nov. 18, 1883, *Cummings 56982* (W). BRISTOL CO.: on old wood, New Bedford, 1862–1898, *Willey* (US); on rocks, New Bedford, *Willey 42* (FM,MIN).



NEW YORK: JEFFERSON CO.: vicinity of Fishers Landing, July 3, 1902, *Robinson & Maxon 80* (FM). YATES CO.: rocks, Quarry Hill, Penn Yan, Sept. 1850, *Buckley* (MBG).

PENNSYLVANIA: PIKE CO.: Matamoras, Sept. 24, 1896, *Schneider* (MIN). CHESTER CO.: on rocks, 1878, *Rothrock* (FM). LANCASTER CO.: on rocks, Chestnut Hill, June 1893, *Eby* (MBG); on rocks, Mar. 1884, *Eby* (MBG).

DELAWARE: NEWCASTLE CO.: on dry rocks, Faulkland, Feb. 7, 1887, *Cummons* (NYBG).

MARYLAND: MONTGOMERY CO.: rock outcrop, west knoll, Plummers Island in Potomac River, near Cabin John, Nov. 6, 1938, *Leonard* (US); rocks, Sligo Creek, 1900, *Williams* (US,WIS). PRINCE GEORGES CO.: rocks in stream, Oct. 5, 1935, *Schulz* (M).

DISTRICT OF COLUMBIA: *Lugger* (MIN).

NORTH CAROLINA: DAVIDSON CO.: on exposed rock, Friedberg section, July 1, 1922, *Schallert* (WIS). CHATHAM CO.: on exposed rock, Bennetts Stone Quarry, May 3, 1929, *Schallert* (WIS).

FLORIDA: ORANGE CO.: on *Quercus*, Sanford, Apr. 1922, *Rapp* (BPI).

ALABAMA: LEE CO.: on rock, Auburn, Feb. 20, 1897, *Earle & Baker* (MBG,MIN).

MICHIGAN: KEWEENAW CO.: on stones, Isle Royale, July 1904, *Harper & Harper 112* (FM). COUNTY UNKNOWN: Sailors Encampment, Aug. 22, 1899, *Harper & Harper 39* (FM); loosely covering rocks, Sailors Encampment, Aug. 27, 1899, *Harper & Harper 27* (FM).

OHIO: HOCKING CO.: on sandstone boulders, Oct. 20, 1935, *Wolfe 355* (O). JACKSON CO.: on sandstone at edge of cliff, May 6, 1934, *Wolfe & Couep* (O). ATHENS CO.: on rock, Apr. 4, 1936, *Wolfe 567* (O).

INDIANA: CRAWFORD CO.: on sandstone rock, along Little Blue River near old Canes Mill, about 2 miles south of Grantsburg, June 7, 1929, *Deam 46* (BPI).

TENNESSEE: HAMILTON CO.: on rocks, Lookout Mountain, *Calkins 3* (MBG); on rocks, Lookout Mountain, *Calkins 7* (MIN); Lookout Mountain, *Calkins 1* (FM).

WISCONSIN: RACINE CO.: Valley of the Wisconsin River, near Linwood Ferry, Summer 1894, *Cheney 3485* (WIS). ADAMS CO.: bluffs, 10 miles east of Friendship, Sept. 13, 1935, *Thomson* (WIS).

ILLINOIS: JACKSON CO.: on sandstone boulders near Bat Cave, 5 miles southwest of Pomona, Apr. 14, 1940, *Hubricht B1735* (MBG).

MINNESOTA: COOK CO.: on rocks, Grand Portage Island, June 23, 1897, *Fink 103* (MIN); on rocks, Grand Marais, July 24, 1902, *Fink 5208* (MIN). LAKE CO.: on rocks, Snowbank Lake area, July 27, 1897, *Fink 967* (MIN). ST. LOUIS CO.: on rocks, Harding, Aug. 19, 1901, *Fink 1602* (MIN); on rocks, Tower, Aug. 24, 1901, *Fink 1743* (MIN). CARLTON CO.: on rocks, Tafte, Carlton Peak, July 10, 1897, *Fink 621* (MIN); on rocks, Kettle Falls, Aug. 9, 1901, *Fink 1330* (MIN). KOOCHICHING CO.: on rocks, Gunflint, June 30, 1897, *Fink 289* (MIN); on rocks, Palisades, July 15, 1897, *Fink 755* (MIN). BLUE EARTH CO.: on rocks, Mankato, June 26, 1899, *Fink 105* (MIN). LAKE OF THE WOODS CO.: Lake of the Woods, July 1896, *Millan 2* (MIN); BELTRAMI CO.: on granite, Bemidji, July 16, 1900, *Fink 745* (MIN). YELLOW MEDICINE CO.: on rocks, Granite Falls, July 12, 1899, *Fink 449* (MIN). ROSEAU CO.: on the big rock, Warroad, July 4, 1901, *Fink 368* (MIN). PENNINGTON CO.: on exposed granite rock, Thief River Falls, July 20, 1900, *Fink 832* (MIN). CLAY



CO.: on rocks, Ulen, July 5, 1899, *Fink 269* (MIN). COUNTY UNKNOWN: on rocks, Blueberry Island, July 13, 1901, *Fink 567* (MIN); on rocks, Misquah Hills, July 5, 1897, *Fink* (MIN).

IOWA: CLAYTON CO.: on sandstone, Sept. 1894, *Fink* (MIN). POWESHIEK CO.: in protected but not disintegrated places on sandstone, Grinnell, Mar. 13, 1904, *Fink 147* (FM). LYON CO.: on rocks, northwest corner, Aug. 6, 1896, *Shimek* (IA); on rocks, northwest corner of county, near White farm, June 1897, *Shimek* (IA).

MISSOURI: WAYNE CO.: on granite rocks, Clark Mountain, *C. Russell* (MBG). ST. LOUIS CO.: on rocks, Ranken Estate, Apr. 30, 1939, *Berry* (MBG). IRON CO.: on exposed rocks, top of Pilot Knob, Dec. 1900, *C. Russell* (MBG); full sun to semi-shade, Royal Gorge, 3 miles east of Arcadia, Nov. 19, 1939, *Hubricht B1721* (MBG). ST. FRANCOIS CO.: on rocks, open woods, Koester, June 10, 1939, *Hubricht B1501* (MBG); surface of sandstone ledge, glade, Pickle Springs, May 21, 1938, *Berry* (MBG). WASHINGTON CO.: exposed limestone cliffs, Vineland, Mar. 1898, *C. Russell 137* (MBG). FRANKLIN CO.: on limestone ledges, Gray Summit, Nov. 15, 1936, *Berry* (MBG). REYNOLDS CO.: on granite rocks, north fork of Black River, Nov. 18, 1938, *Schmitt* (MBG). GREENE CO.: rocky wooded bank of James River, 8 miles south of Springfield, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

ARKANSAS: WHITE CO.: near Judsonia, Dec. 28, 1938, *Anderson* (MBG). BOONE CO.: rocky wooded bluff, above dry creek bed, Bear Creek Spring, .5 miles north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). GARLAND CO.: dry exposed rock, Hot Springs, Dec. 25, 1899, *C. Russell 15* (MBG); on rocks, open slope, North Mountain, Hot Springs, Nov. 12, 1938, *Schull* (MBG). NEWTON CO.: high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); steep dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

KANSAS: DOUGLAS CO.: on sandstone, Jan. 1895, *Bridwell 111* (F).

OKLAHOMA: DELAWARE CO.: Dripping Springs, near Mosby, Apr. 19, 1936, *Fasset* (WIS).

TEXAS: BREWSTER CO.: full sun to semi-shade, Castle Rock, south end of Chisos Mountains, May 28, 1938, *Hubricht B869* (MBG); full sun to semi-shade, 18 miles south of Marathon, May 27, 1938, *Hubricht B856* (MBG). PRESIDIO CO.: full sun to semi-shade, Wire Gap, head of South Canyon, 15 miles southeast of Casa Piedra, May 30, 1938, *Hubricht B962* (MBG). CULBERSON CO.: full sun to semi-shade, Beach Mountain, 8 miles north of Van Horn, *Hubricht B963* (MBG).

WYOMING: WASHAKIE CO.: in crevices of boulders, Soldiers Park, North Fork of Clear Creek, Big Horn Mountains, Aug. 19, 1898, *Williams 316* (MBG). YELLOWSTONE PARK: 1922, *Hawkins 17a* (WIS). COUNTY INDEFINITE: Rocky Mountain Flora, Latitude 60°, *Hall* (FM).

COLORADO: EL PASO CO.: Pikes Peak, Aug. 1901, *Harper & Harper* (FM); on rocks, Colorado Springs, Sept. 6, 1904, *Clements & Clements* (MIN).

NEW MEXICO: VALENCIA CO.: on rock, semi-shade, 16 miles south of El Morro, June 19, 1938, *Hubricht B1094* (MBG).

ARIZONA: COUNTY UNKNOWN: under andesitic precipice, Barfoot Peak, Oct. 8, 1906, *Plummer 1469* (FM).

WASHINGTON: FERRY CO.: on rocks, Republic, 1913, *Foster 103* (FM).

CALIFORNIA: LOS ANGELES CO.: on rocks, moss and earth, mountain top, Santa



Catalina Island, *Nuttall 434* (FM). SANTA CLARA CO.: on rocks, Los Trancos Road, elev. 400 ft., Mar. 22, 1904, *Herre* (MIN); on rocks in foothills, elev. 150 ft., Apr. 9, 1904, *Herre 392* (MIN).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Bal. 4234; Bartl. VIII 6; Breut. 402; Claud. 15; Cromb. 26; Cum. I 10, II 86; Desm. ed. II, ser. II 586; Elenk. 54a, c; Fellm. 79; Flk. 34; E. Fries 167; Funck, II 109; Hav. 153; Howe, 27; Johns. 303; Larb. Caes. 65; Malbr. 270; Malme, 204; Mand. 11; Mass. 314; Meresch. 55; Merr. 251; Norrl. et Nyl. 26; R. & S. 11; Roum. 44; Salw. 144; Schl. Cent. IV 46; Stenh. 122; Wain. 106; West. 1041.

**17a. *Parmelia conspersa* var. *isidiata* (Anzi) Berry, n. comb.**  
*Parmelia conspersa* f. *isidiata* Anzi, Cat. Lich. Sondr. 28. 1860.

*Imbricaria conspersa* f. *isidiata* Arn., Flora 67: 163. 1884.

Anzi's type of the form is Anzi, Lich. Exsic. Ital. 110. Arnold cites Anzi in transferring the form to *Imbricaria*. The type of the new combination is *Flint*, University of Montana. The new combination was made because the outgrowth of coralloid branchlets from the thallus is considered to be a character of the order of a variety. The use of the form is reserved for less specialized variations.

The upper surface of the thallus is covered with coralloid branchlets, otherwise the characters of size, habit, habitat, chemical reaction, and spore measurements are the same as those of the species.

Distribution: Nova Scotia to Tennessee, west to California.

NOVA SCOTIA: on rocks, Yarmouth, June 10, 1910, *Macoun* (MBG).

VERMONT: RUTLAND CO.: on lime rocks, Brandon, elev. 600 ft., Dec. 1, 1922, *Dutton 1970* (MBG).

MASSACHUSETTS: BRISTOL CO.: on old fence, country road, New Bedford, Dec. 1895, *Willey* (US).

TENNESSEE: HAMILTON CO.: Lookout Mountain, *Calkins 1* (MBG).

WISCONSIN: SAUK CO.: Parferys Glen, Oct. 1936, *J. Thomson* (WIS).

TEXAS: GILLESPIE CO.: Young Blood Creek, *Jermy 431* (MBG).

MONTANA: MISSOULA CO.: from rocks, Lower Pattee Canyon, Jan. 15, 1934, *Flint* (MONT). FLATHEAD CO.: on rocks at northwest corner Gravelly Range Lake, Apr. 14, 1931, *Flint* (MONT).

IDAHO: BONNER CO.: shale rock of Shoshone Range, Little Sentinel Peak, Aug. 30, 1931, *Flint* (Type of variety) (MONT); on rock, near Cabinet, Nov. 4, 1934, *Flint* (MONT).

CALIFORNIA: LOS ANGELES CO.: rough sunny lava, Puddingstone Dam, San Jose Hills, elev. 900 ft., May 5, 1933, *Wheeler 1713* (MBG).

FOREIGN EXSICCATAE EXAMINED: Johns. 221.



**18. *Parmelia lineola* Berry, sp. nov.**

Thallus large, orbicular in outline, adnate to surface of rock; upper surface brownish-gray in the center to olive-green at the margins, much wrinkled, with many cracks in the cortex; black ostioles of the spermagonia numerous on the younger portions of the thallus; lobes narrow, subdichotomously branched, imbricated, margins thin, smooth; lower surface dark brown to black, rhizinae black, small and thinly scattered; lower cortex much wrinkled but not broken, with cracks as on the upper cortex; apothecium sessile, 1–6 mm. diameter, disk black, concave or flat, margin thin, smooth, and somewhat crinkled; K, yellow then brown, C, none, K + C, none, P, none.

Upper cortex of vertical hyphae very dense, almost pseudo-parenchymatous, matrix yellow, 45–50  $\mu$  thick; algal layer discontinuous, gonidia formed of scattered groups of from 2 to 12 algal cells, located directly beneath the upper cortex; algae *Protococcus*; medulla of very loosely interwoven hyaline hyphae; lower cortex 36–38  $\mu$  thick, matrix yellow or brownish-yellow; thecium 80–85  $\mu$  thick; ascus clavate, spores 8, 7–10  $\times$  12–16  $\mu$ , hyaline; paraphyses branched once or twice, tips enlarged.

Thallus orbiculatus ad saxa adnatus; superficies superior rugosa, cortice fisso; spermagonia numerosa in thallo juvenili; laciniae lineares, subdichotome ramosae, olivaceo-virides ad griseo-brunneae; superficies inferior nigro-brunnea ad nigra, rhizinis parvis, nigris, tenuibus, sparsis; medulla KOH addito flavescens, CaOCl<sub>2</sub>, K et C addito non mutans; apothecium sessile, 1–6 mm. diametro, discus niger, concavus aut planus; amphithecum tenue, undulato-crenulatum; cortex superior densus, 45–50  $\mu$  crassitudine; algae Protococcidae; stratum gonidiale discontinuum, gonidia catenulata, 2–12 algarum cellulis; medulla laxe reticulata, hyphis hyalinis uniformibus; cortex inferior 36–38  $\mu$  crassitudine; thecium 80–85  $\mu$  crassitudine; asci clavati, sporae 8-nae, 7–10  $\mu$  crassitudine, 12–16  $\mu$  longitudine, ellipsoideae; paraphyses cum ramis binis vel ternis, apicibus dilatatis.

Distribution: Montana to Texas, west to Utah and Arizona.



TEXAS: CULBERSON CO.: full sun to semi-shade, north side of summit of Van Horn Mountains, 15 miles south of Van Horn, June 2, 1938, *Hubricht B937* (MBG).

MONTANA: FLATHEAD CO.: two and one half miles up Glen Trail east from Flathead Lake, Nov. 18, 1934, *Flint* (MONT).

WYOMING: YELLOWSTONE PARK, 1922, *Hawkins 17c* (WIS). CROOK CO.: Sundance Mountain, July 3, 1896, *A. Nelson* (MBG). FREMONT CO.: Pole Creek, July 1, 1895, *A. Nelson* (MBG). COUNTY UNKNOWN: on the rocks of the cliffs, Gibbon Meadow, July 28, 1899, *Nelson & Nelson 6192* (MIN, MBG).

NEW MEXICO: SOCORRO CO.: semi-shade, San Andres Mountains, Rhodes Pass, 47 miles west of Tularosa, June 6, 1938, *Hubricht B1006* (MBG). VALENCIA CO.: semi-shade, 7 miles north of Trechado, June 9, 1938, *Hubricht B1074* (MBG); semi-shade, 2 miles southeast of Ramah, June 10, 1938, *Hubricht B1114* (MBG). SIERRA CO.: full sun, 9 miles west of Engle, June 7, 1938, *Hubricht B1019* (MBG).

ARIZONA: APACHE CO.: on rock, open woods, 3 miles northwest of Ft. Defiance, June 12, 1938, *Hubricht B1170* (Type collection) (MBG); on log, open woods, 3 miles northwest of Ft. Defiance, June 12, 1938, *Hubricht B1181* (MBG); canyon wall, Massacre Cave, Canyon del Muerto, Aug. 14, 1939, *Cutler* (MBG).

UTAH: SAN JUAN CO.: full sun to semi-shade, 5 miles north of Blanding, June 22, 1938, *Hubricht B1223* (MBG).

**19. *Parmelia leucochlora* Tuck., Syn. N. Amer. Lich. 1: 64. 1882.**

Tuckerman's type is the collection of Veitch made in the state of Mississippi.

Thallus oval or irregular in outline, small to medium-sized, adnate to bark of trees; upper cortex wrinkled, but free from any type of outgrowth, pale yellow or straw color above; lobes rounded, short and rather wide, deeply dissected, with the edges imbricated, lower surface olive-brown, with many small evenly distributed rhizinae of lighter color than the lower cortex; apothecia sessile, 1–5 mm. diameter, slightly concave, disks chestnut-brown, margin slightly crenate; K, medulla and upper cortex yellowish-green, C, none, K + C, none, P, none.

Algal layer continuous, slightly lobed on the under side, 60–75  $\mu$  thick; upper cortex of vertical hyphae with a yellow matrix, 30–40  $\mu$  thick; medulla of loosely interwoven hyphae of one type, 1–2  $\mu$  in diameter; lower cortex with a yellow matrix, 18–20  $\mu$  thick; thallus 280–300  $\mu$  thick; thecium 60–70  $\mu$  thick; spores 8 to an ascus, almost spherical, 7–10  $\times$  9–12  $\mu$ , ascus clavate; amphithecium with a continuous layer of algal cells; paraphyses clavate at tips, branched once or twice.

The plant differs from *P. conspersa* (Ehrh.) Ach. in the size



of the spores, the color of the under cortex, and in chemical reaction. The distribution is definitely southern and southeastern.

Distribution: South Carolina to Florida, west to Texas.

SOUTH CAROLINA: BEAUFORT CO.: Beaufort, 1868, *Mellichamp* (T).

FLORIDA: VOLUSIA CO.: New Smyrna, Apr. 18, 1921, *Kelly* (NYBG, BPI). DUVAL CO.: on oaks, Fort George Island, *Calkins 6* (W, MBG). ORANGE CO.: on oaks, Sanford, 1905, *Rapp 18* (F). COUNTY UNKNOWN: *Miss Wilson* (BSNH).

MISSISSIPPI: COUNTY UNKNOWN: 1845, *Dr. Veitch* (Type collection) (T).

LOUISIANA: COUNTY UNKNOWN: 1853, *Hale* (T).

ARKANSAS: NEWTON CO.: steep dry wooded bluff with rocky flat at top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

TEXAS: AUSTIN CO.: on cedar twigs, Austin, Apr. 1928, *Plitt 34* (BPI).

### III. HYPOTRACHYNA

**Parmelia** subgenus **Euparmelia** sect. **III. Hypotrachyna**  
Zahl. apud Engler & Prantl, Nat. Pflanzenfam. I Teil, Abt. 1:  
212. 1907.

*Parmelia* section *Hypotrachyna* Wainio, Étude Lich. Brésil  
1: 38. 1890.

Zahlbruckner's type of the section is *Parmelia sublinearis*  
Wainio. Wainio's type is *Parmelia acanthifolia* Pers.

Thallus dark greenish-gray or darker, under surface black,  
except in *P. rudecta*, *P. Borreri* and *P. cubensis*; rhizinae  
always present and evenly distributed; medulla loosely inter-  
woven, without a cavity, hyphae always of one type, hyaline  
and of small diameter. The distribution of the section is world-  
wide, with the greatest number of species from the tropics.

#### KEY TO SPECIES IN EUPARMELIA SECTION HYPOTRACHYNA

- A. Thallus grayish-green or darker.
  - B. Thallus light-colored below.
    - C. With soredia above; K, none, C, none.....28. *rudecta*
    - C. With coralloid branchlets above; K, yellow, C, red.....24. *Borreri*
  - B. Thallus brown to black below.
    - C. Lobes narrow.
      - D. With coralloid branchlets above.
        - E. Lobes more or less branched.
          - F. Thallus small, with scattered black rhizinae; K, none, C, red....  
.....34. *Finkii*
          - F. Thallus large, with many black rhizinae; K, yellow, C, yellow.



- G. Thallus light to dark but not black.....21. *saxatilis*  
 G. Thallus black and granular.....21a. *saxatilis* var. *Anzi*  
 E. Lobes rarely branched, sometimes bearing fibrils on upper surface;  
 K, brown, C, yellow.....35. *caroliniana*  
 D. Without coralloid branchlets above.  
 E. Lobes dichotomously branched; K, none, C, brown.....23. *Herrei*  
 E. Lobes irregular or subpinnately branched.  
 F. Rhizinae papillose; K, none, C, none.....27. *texana*  
 F. Rhizinae strong, numerous.  
 G. Medulla sulphur-yellow; K, none, C, none.....41. *sulphurosa*  
 G. Medulla white; K, none, C, orange-brown.....33. *livida*  
 C. Lobes wide.  
 D. Margins flat or very slightly raised.  
 E. With marginal soredia or black cilia.  
 F. With marginal soredia; K, none, C, none.....30. *cestrata*  
 F. With heavy black marginal cilia; K, none, C, none.....  
 .....30a. *cestrata* var. *subisidiosa*  
 E. Without marginal soredia.  
 F. Rhizinae numerous; K, red-brown, C, none.....29. *reticulata*  
 F. Rhizinae few; K, yellow, C, none.....26. *quercina*  
 D. Margins raised, under side white.  
 E. With marginal cilia; K, none, C, yellow.....32. *erecta*  
 E. Without marginal cilia; K, cortex yellow-green, medulla none,  
 C, none.....31. *Hubrichtii*  
 A. Thallus pale yellowish-green to yellowish-brown.  
 B. Thallus yellowish-brown or darker, lobes smooth or with coralloid branch-  
 lets.....20. *omphalodes*  
 B. Thallus pale yellow-green to yellow-brown.  
 C. Lobes narrow.  
 D. Closely adnate.  
 E. Lower surface light brown; K, none.....37. *cubensis*  
 E. Lower surface black; K, brown.....36. *sublaevigata*  
 D. Loosely adnate; lower surface black.....38. *laevigata*  
 C. Lobes wide.  
 D. Upper cortex smooth, unbroken.  
 E. Medulla yellow, K, brown; lower surface dark.....40. *aurulenta*  
 E. Medulla white; K, yellow; lower surface light.....39. *endoxantha*  
 D. Upper cortex pitted, or reticulately sorediate.  
 E. Upper cortex pitted; lower surface light; K, none.....25. *Bolliana*  
 E. Soredia in reticulate ridges; lower surface black; K, yellow....  
 .....22. *sulcata*

**20. *Parmelia omphalodes* (L.) Ach., Meth., Lich. 204. 1803.**

*Lichen omphalodes* Linn., Sp. Pl. 1143. 1753.

*Parmelia saxatilis* var. *omphalodes* Fr., Lichenogr. Eur. Reform. 62. 1831.



Acharius' type was from Linnaeus' herbarium. The type is now in the Linnean Herbarium in London. The plant used by Linnaeus was probably collected in central Europe. Fries cites as typical plants of his variety, E. Fries, *Lich. Suec. Exs.* 108, and Moug. & Nest. *Exs.* 348.

Thallus 4–10 cm. diameter, loosely adnate to stones or rarely to firm earth, shining olive-brown to dark brown or black; upper surface rough with wrinkles and thickly covered with coralloid branchlets or granules and flat lobules, lobes long, narrow, much branched, dissected, and imbricated; lower surface wrinkled but unbroken; cortex black, numerous strong black rhizinae to the margins of the thallus; apothecium 1–4 mm. diameter, sessile, disk slightly concave or flat, chestnut-brown, margin of amphithecium covered with coralloid branchlets; K, upper cortex and medulla yellow then brown, C, none, K + C, none, P, none.

Algal layer continuous, irregular in thickness, 5–50  $\mu$  thick; upper cortex 20–24  $\mu$  thick, matrix brown; medulla loosely interwoven, hyphae of one type, hyaline; lower cortex 20–36  $\mu$  thick, matrix black or dark brown; thallus 160–180  $\mu$  thick; thecium 48–60  $\mu$  thick; ascus clavate, spores 8, 3–4  $\times$  5–6  $\mu$ ; paraphyses branched.

Collections of this species from Europe are usually larger in external respects than American collections, and very rarely have the coralloid branchlets on the upper surface. There is a tendency to form overlapping layers of the thallus which helps to distinguish this species from *Parmelia saxatilis* (L.) Ach. in the field.

Distribution: Labrador to New Hampshire, west to Alaska and British Columbia.

LABRADOR: on rocks, Red Bay, Aug. 12, 1889, *Waghorne* (US).

QUEBEC: on wet stones, Ste. Anne, Apr. 30, 1936, *Lepage 386* (MBG).

NEW HAMPSHIRE: COUNTY INDEFINITE: on rocks, mountains, *Calkins* (FM); on trees, mountains, *Calkins 376* (FM).

ALASKA: on the Arctic Ocean, ten miles east of Cape Lisbon, Aug. 22, 1880, *Bean* (FM).

BRITISH COLUMBIA: on rocks, Deer Park, Columbia River, June 1890, *Macoun 86* (WIS); on rocks, Ucluelet, Vancouver Island, July 4, 1908, *Macoun* (MBG).



21. *Parmelia saxatilis* (L.) Ach., Meth. Lich. 204. 1803.

*Lichen saxatilis* Linn., Sp. Pl. 1142. 1753.

*Lobaria saxatilis* Hoffm., Deutschl. Fl. 2: 145. 1795.

*Parmelia saxatilis* var. *leucochroa* Wallr., Fl. Crypt. German. 3: 499. 1831.

Linnaeus' type was a European collection, which is still in his herbarium in London. Acharius accepted this plant as the type, transferring it from the genus *Lichen* to *Parmelia*. He cites Jacquin, 'Collectanea' 4: 281. t. 20, f. 2. 1790, which is designated *Lichen saxatilis*, as synonymous with his plant. Hoffmann cites Jacquin's figure as synonymous with his *Lobaria saxatilis*. The type of Hoffmann is unknown. Wallroth cites Linnaeus' plant and the figure of Jacquin as synonymous with his concept of the variety *leucochroa*.

Thallus foliose, 6–10 cm. diameter, appressed; upper surface smooth, slightly cracked or with few scattered soredia, lobes linear, narrow, imbricated, dichotomously or subdichotomously branched, margins very slightly ascending; lower surface black to the margins, rhizinae black, numerous, papillose at the margins, long at the center of the thallus; apothecium sessile, 3–10 mm. diameter, disk concave, chestnut-brown, margin crenulate, dissected irregularly and usually sorediate; K, upper cortex yellow, medulla yellowish-green then reddish-brown, C, medulla and upper cortex yellow, K + C, yellow, P, red-brown.

Algal layer continuous, 16–18  $\mu$  thick; upper cortex 24–28  $\mu$  thick; medulla of loosely interwoven hyphae of one type; lower cortex 32–33  $\mu$  thick; thickness of thallus 131–138  $\mu$ ; thecium 40–44  $\mu$  thick; ascus clavate, spores 8, 8–9  $\times$  15–16  $\mu$ ; paraphyses branched, enlarged at tip; spermagonia immersed in surface of thallus lobes, spherical, walls black above, brown or hyaline below, opening by black ostioles, spermatophores simple, spermatia fusiform.

Distribution: Newfoundland to Florida, west to Washington and California.

NEWFOUNDLAND: on trees, Bar Harbor, June 24, 1893, *Waghorne* (MBG); on rocks, Western Cove, White Bay, Dec. 11, 1891, *Waghorne* (MBG); Chance Cove,



Trinity Bay, Sept. 12, 1882, *Waghorne* (MBG); on trees, New Harbor, Sept. 21, 1893, *Waghorne 39* (MIN).

NOVA SCOTIA: on rocks, Springfield, Aug. 17, 1910, *Macoun* (F); on twigs and branches, *Rothrock* (FM).

QUEBEC: mossy woods between Lac Mont Louis and the North Fork of Madeleine River, July 31, 1923, *Fernald, Dodge & Smith* (MBG); on rocks covered by leaf mould, Ste. Anne, May 5, 1935, *Lepage 135* (D); on rocks, Ste. Anne, May 5, 1935, *Lepage 139* (D); adherent to rocks, Ste. Anne, May 11, 1935, *Lepage 115* (D); on dry rocks, Ste. Anne, May 15, 1935, *Lepage 138* (D); on boulders, Ste. Anne, May 30, 1935, *Lepage 269* (D).

ONTARIO: on rocks, Emo, July 20, 1901, *Fink 768* (MIN); quite common on trees, dead wood, and rocks, Belleville, 1871, *Macoun 73* (WIS,MIN,MBG); on trees and old logs, Ottawa, Apr. 26, 1896, *Macoun* (MBG).

MAINE: HANCOCK CO.: on rock, Mount Desert Island, Cliffwalk, Seal Harbor, July 12, 1894, *Merrill* (D). KNOX CO.: on trunks of trees, Camden, May 21, 1912, *Merrill* (WIS,MBG,FM). CUMBERLAND CO.: on trees, Cumberland, 1855, *Blake* (FM); on granite, St. Thomason, Sept. 17, 1910, *Merrill* (F).

NEW HAMPSHIRE: COOS CO.: near top of Mount Washington, Aug. 1926, *Kirk* (F).

VERMONT: WINDSOR CO.: ledges, Mount Horrid, Rochester, elev. 2700 ft., Oct. 3, 1920, *Dutton 1110* (FM); base of shaded ledges, Mount Horrid, Rochester, Oct. 3, 1920, *Dutton* (MBG). RUTLAND CO.: on dead wood, Pawlet, Mar. 22, 1913, *Dodge 157* (D).

MASSACHUSETTS: BARNSTABLE CO.: on trees, near Morrison, Cape Cod, July 14, 1937, *Berry* (MBG). ESSEX CO.: on rocks, Rockport, Apr. 7, 1899, *Cummings 274* (FM). BRISTOL CO.: on bark, New Bedford, *Willey* (MIN); on rocks and trunks, New Bedford, *Willey* (FM); on moss, New Bedford, *Willey* (MBG).

NEW YORK: ESSEX CO.: Newcomb, June 8, 1922, *House* (F). YATES CO.: on wood, Penn Yan, *Buckley* (MBG); Dundee, *Wright* (FM).

PENNSYLVANIA: PIKE CO.: Sept. 24, 1896, *Schneider* (MBG). HUNTINGTON CO.: on trees, Pennsylvania State College Nature Camp, 16 miles southeast of State College, July 23, 1937, *J. Thomson* (WIS).

VIRGINIA: LEE CO.: edge of wood, Hunters Gap, Powell Mountain, 2.7 miles north of Blackwater, Aug. 23, 1937, *Hubricht B404* (MBG).

NORTH CAROLINA: ALEXANDER CO.: on bark of tree, Mount Pisgah, Sept. 9, 1922, *Schallert 3094* (WIS). MITCHELL CO.: on rock, Roan Mountain, June 15, 1936, *Schallert* (B); on Roan Mountain, July 16, 1891, *Small* (MBG).

SOUTH CAROLINA: COUNTY UNKNOWN: on rocks, Rocky Spur, Jan. 14, 1928, *Evans* (F).

FLORIDA: ALACHUA CO.: on red maple, low hammock, near Gainesville, Mar. 14, 1938, *Murrill* (D). COUNTY INDEFINITE: on trees, Black Forest, Sept. 1913, *Rapp* (F).

MICHIGAN: KEWEENAW CO.: Isle Royale, Aug. 12, 1901, *Stuntz & Allen* (WIS); south of lighthouse, Isle Royale, Aug. 12, 1901, *Stuntz & Allen* (WIS).

ILLINOIS: LASALLE CO.: on trees and rocks, *Calkins* (F). MENARD CO.: Athens, *Hall* (FM).

KENTUCKY: LAUREL CO.: deep wet woods 8.4 miles north of East Bernstadt, Aug. 18, 1937, *Hubricht B275* (MBG).



TENNESSEE: HAMILTON CO.: on trees, Lookout Mountain, *Calkins 285* (MIN).

MINNESOTA: COOK CO.: on young spruce trees near water, Grand Marais, July 21, 1902, *Fink 5138* (MIN); on soil-covered rocks, Grand Marais, July 21, 1902, *Fink 5133* (MIN). LAKE CO.: Baptism River, Aug. 1896, *Elfman* (WIS). ST. LOUIS CO.: on cedars in swamps, Harding, Aug. 16, 1901, *Fink 1506* (MIN). KOOCHICHING CO.: on cedars in swamps, Koochiching, July 29, 1901, *Fink 999* (MIN). BELTRAMI CO.: on tamarack in swamp, Bemidji, July 7, 1900, *Fink 621* (MIN); on old pine logs, Red Lake, July 26, 1900, *Fink 891a* (MIN); on trees in swamp, Beaudette, June 18, 1901, *Fink 29* (MIN); on cedar in swamps, Beaudette, June 22, 1901, *Fink 112* (MIN); on cedars in swamp, June 24, 1901, *Fink 129* (MIN). HUBBARD CO.: on balsam, Park Bay, Aug. 29, 1902, *Fink* (MIN). BECKER CO.: on rocks, Oak Island, July 9, 1901, *Fink 435* (MIN). OTTERTAIL CO.: on tamarack in swamp, Henning, June 25, 1900, *Fink 190* (MIN).

WISCONSIN: FOND DU LAC CO.: two miles south of Hamilton, May, 1936, *J. Thomson* (WIS). VILAS CO.: valley of the Wisconsin River, near Lac Vieux Desert, Summer 1893, *Cheney* (WIS). DANE CO.: east side of Picture Rock, Oct. 2, 1938, *Skinnners* (WIS). JUNEAU CO.: north of Necedah, Apr. 1936, *J. Thomson* (WIS). SAUK CO.: on rocks, Devils Lake, Oct. 23, 1936, *J. Thomson* (WIS).

IOWA: BREMER CO.: on trees, July 1894, *Fink* (MBG).

MISSOURI: WAYNE CO.: on granite rocks, Piedmont, Mar. 1899, *C. Russell* (MBG).

ARKANSAS: CHICOT CO.: near Macon, Dec. 29, 1938, *E. Anderson* (MBG).

MONTANA: MISSOULA CO.: on granite rocks, sheltered spots, Black Bear Mountain, Bitter Root Mountains, Aug. 4, 1931, *Flint* (MONT).

WYOMING: YELLOWSTONE PARK, 1922, *Hawkins* (WIS).

COLORADO: WELD CO.: over siliceous rocks and mosses, south St. Vrain Canyon, elev. 7200 ft., Oct. 7, 1938, *Kiener* (MBG). EL PASO CO.: on moss-covered rock, elev. 8300 ft., Minnehaha, near Pikes Peak, July 1919, *I. M. Johnston* (F); on dead spruce, Palmer Lake, July 9, 1928, *Laedig* (F).

NEW MEXICO: RIO ARRIBA CO.: northward face of cliff, vicinity of Brazos Canyon, Sept. 4, 1914, *Standley & Bollman* (US).

ALASKA: logs in Cross Sound, June 18, 1880, *Bean* (FM); Unalaska, July 28, 1882, *Bean* (FM); on *Picea*, near Kink, Aug. 1913, *Cheney 159* (MBG); on bark of trees, Quinhagak, Nov. 19, 1921, *Stecker* (FM); at Cape Lisbon, Arctic Ocean, *Bean* (FM).

BRITISH COLUMBIA: on trees and old fences, Comox and Victoria, Vancouver Island, May 1893, *Macoun 150* (MIN, MBG); on boulders, Sidney, Vancouver Island, Sept. 26, 1913, *Macoun* (F); Vancouver Island, Oregon Boundary Commission, 1858-59, *Lyall* (F); New Westminster, Jan. 1903, *Macoun* (F).

WASHINGTON: WHITMAN CO.: on thin soil, Pullman, Feb. 22, 1901, *Cotton* (F). SPOKANE CO.: on granitic rocks, Spokane, Dec. 29, 1906, *Bonser* (F). KLICKITAT CO.: north face of boulder, Little Klickitat Bluffs, Goldendale, Oct. 24, 1909, *Foster* (F). ISLAND CO.: on rock, Langley, June 1923, *Grant* (D); on trees, Montesano, June 1919, *Grant* (F). CHEHALIS CO.: near Aberdeen, Apr. 4, 1909, *Foster* (D).

CALIFORNIA: NAPA CO.: on oak trees 1 mile south of Pope Valley Post-office, July 9, 1938, *Ownbey & Ownbey* (MBG). SHASTA CO.: on bark of tree, region of upper Sacramento, July 24-Aug. 10, 1894, *Howe* (US). SAN MATEO CO.: on sand-



stone hills 4 miles west of Stanford University, elev. 300 ft., July 22, 1903, *Herre 172* (MIN,MBG); on sandstone, Pilarcitos Creek, elev. 200 ft., 2 miles from Pacific Ocean, June 30, 1906, *Herre 830* (MIN,F). COUNTY UNKNOWN: on sandstone rocks, Searsville Ridge, elev. 500 ft., July 22, 1903, *Herre* (F).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Bohl. 11; Claud. 173; Cromb. 27; Cum. I 352; Cum. II 274; Desm. ed. I. ser. I 1940, ed. II. ser. I 1590; Elenk. 53 a-c; Erb. I 118; Fellm. 77; E. Fries 168; Funck, II 108; Hav. 179, 223; Larb. Herb. 211; Leight. 203; Malme, 265; Moug. & Nest. 249; Oliv. 116; R. & S. 35; Rab. Cent. 16; Salw. 140; Stenh. 155 (*saxicola*), 156 (*corticola*); Trev. 267.

**21a. *Parmelia saxatilis* var. *Anzi* Del. apud Duby, Bot. Gallic. 2: 602. 1830.**

*Parmelia horrescens* Tayl. apud Mack., Fl. Hibern. 2: 144. 1836.

Delise's type was from France and is in his herbarium. Taylor's type of *P. horrescens* was from County Kerry, Ireland, and is in his herbarium at the Boston Society of Natural History in Boston.

Thallus grayish-white, densely clothed with grayish-brown isidioid excrescences, otherwise as in the species; K, upper cortex and medulla yellow, medulla becoming red-brown; C, upper cortex and medulla yellow, K + C, yellow, P, red-brown.

The distribution of the variety is limited to the northern part of United States and southern Canada. It is found on wet or shaded rocks.

Distribution: Newfoundland to Maine, west to British Columbia.

NEWFOUNDLAND: on rock, Western Cove, Nov. 12, 1881, *Waghorne* (MIN); on rocks, "Plane Sallon," July 23, 1893, *Waghorne 11* (MIN); on rocks, Red Bay, Aug. 12, 1899, *Waghorne 43* (MIN); Chance Cove, Trinity Bay, Sept. 11, 1892, *Waghorne* (MIN).

QUEBEC: GASPÉ CO.: wet rocks and chimneys, elev. 825-1125 m., Rivière Ste. Anne des Monts, Tabletop Mountains, Aug. 5, 1923, *Fernald, Dodge & Smith* (D).

MAINE: HANCOCK CO.: Salisbury Cove, Aug. 29, 1931, *Plitt* (BPI). KNOX CO.: on granite, South Thomaston, Sept. 17, 1910, *Merrill* (MIN).

NEW HAMPSHIRE: COOS CO.: alpine regions, White Mountains, 1863, *Mann* (FM).

MINNESOTA: YELLOW MEDICINE CO.: Granite Falls, July 17, 1899, *Fink 561* (MIN). CLAY CO.: on rocks in shaded places near Ulen, July 5, 1899, *Fink 268* (MIN).

BRITISH COLUMBIA: Oregon Boundary Commission, Vancouver Island, 1858-59, *Lyall* (WIS).



**22. *Parmelia sulcata*** Taylor apud Mack., Fl. Hibern. 2: 145. 1836.

Taylor's type was from County Kerry, Ireland, and is in his herbarium in the Boston Society of Natural History at Boston.

Thallus loosely adnate, 5–12 cm. diameter; upper surface with reticulate ridges of white soredia, light greenish-gray or light brown, lobes short, wide, rounded, imbricated, dichotomously branched; lower surface black to the margin, with strong black rhizinae to margin of thallus; lower cortex unbroken; apothecium sessile, 1–15 mm. diameter, margin unfisured but slightly sorediate; K, upper cortex yellow, medulla yellowish-brown; C, upper cortex yellow, medulla none; K + C, yellow; P, red-brown.

Algal layer continuous, 20–24  $\mu$  thick; upper cortex 20–28  $\mu$  thick; medulla of loosely interwoven hyphae of one type, hyaline and of small diameter; lower cortex 16–32  $\mu$  thick; thallus 120–160  $\mu$  thick; thecium 64–80  $\mu$  thick; ascus clavate, spores 8, 4–5  $\times$  12–14  $\mu$ ; paraphyses branched.

Distribution: Newfoundland to Tennessee, west to Washington and California.

NEWFOUNDLAND: on rocks, July 7, 1893, *Waghorne* (MBG,MIN); on rocks, Outer Cove, Dec. 11, 1891, *Waghorne* (W).

NOVA SCOTIA: on old boards, rails and trunks, Sable Island, July 27, 1899, *Macoun* (MBG).

MAINE: WASHINGTON CO.: July 1929, *Markin* (WIS). KENNEBEC CO.: on rock maple, Albion, Mar. 23, 1922, *Parlin* 5 (D). CUMBERLAND CO.: on tree trunks and stones, Nov. 7, 1855, *Blake* (FM).

NEW HAMPSHIRE: COUNTY INDEFINITE: summit of Mount Willard, June 2, 1882, *Faxon* (WIS).

VERMONT: WINDSOR CO.: on ledges, Mount Horrid, Rochester, elev. 2700 ft., Oct. 3, 1920, *Dutton* 1110 (WIS). ADDISON CO.: on *Acer rubrum*, college campus, Middlebury, Apr. 12, 1913, *Dodge* 160 (D). RUTLAND CO.: on cedar in swamp, Brandon, elev. 475 ft., Feb. 26, 1921, *Dutton* 1217 (WIS,FM); Chipman Lake, Tinmouth, June 1938, *Dodge* (D).

MASSACHUSETTS: ESSEX CO.: on rocks, Rockport, Apr. 7, 1899, *Cummings* 325 (WIS). MIDDLESEX CO.: Concord, 1863, *Mann* (FM).

OHIO: CLARK CO.: Springfield, 1879, *Mrs. E. J. Spence* (F).

MICHIGAN: KEWEENAW CO.: Isle Royale, Sept. 9, 1901, *Stuntz & Allen* (WIS).

TENNESSEE: COUNTY UNKNOWN: on rocks, *Calkins* 344 (FM).

WISCONSIN: ADAMS CO.: bluffs 10 miles east of Friendship, Oct. 13, 1935, *J. Thomson* (WIS). MONROE CO.: 9 miles west of Tomah, Nov. 14, 1935, *J. Thomson*



(WIS). RICHLAND CO.: valley of the Wisconsin River near Eagle River, June 27, 1893, *Cheney 870* (WIS).

ILLINOIS: LASALLE CO.: on rocks, *Calkins* (FM). COOK CO.: on trees, *Calkins* (FM).

MINNESOTA: ST. LOUIS CO.: on rocks, Tower, Aug. 23, 1901, *Fink 1710* (MIN). CARLTON CO.: on rocks, Kettle Falls, Aug. 12, 1901, *Fink 1380* (MIN). KOOCHICHING CO.: Gunflint, June 30, 1897, *Fink 240* (MIN); on old stump, Battle Lake, June 22, 1900, *Fink 134* (MIN); on rocks, Rainy Lake, Aug. 1, 1901, *Fink 1083* (MIN); on trees, Koochiching, July 25, 1901, *Fink 886* (MIN). BLUE EARTH CO.: on old log, Mankato, June 28, 1899, *Fink 165* (MIN). LAKE OF THE WOODS CO.: on old wood, Lake of the Woods, July 1896, *Millan 3* (MIN). BELTRAMI CO.: on trees, Red Lake, Aug. 2, 1900, *Fink 1049* (MIN); on dead pine logs, Bemidji, July 4, 1900, *Fink 423* (MIN); on oaks, Bemidji, July 4, 1900, *Fink 447* (MIN); on tamarack, in swamp, Bemidji, July 7, 1900, *Fink 525* (MIN); on rocks along Red Lake, Aug. 1, 1900, *Fink 1038* (MIN). YELLOW MEDICINE CO.: on shaded rocks, Granite Falls, July 17, 1899, *Fink 586* (MIN). ROSEAU CO.: on trees, Warroad, June 25, 1901, *Fink 170* (MIN). MARSHALL CO.: on old logs, Thief River, July 19, 1900, *Fink 813* (MIN). ROCK CO.: on Mound Creek, Sept. 1901, *Wheeler* (MIN). COUNTY UNKNOWN: on trees, Flag Island, July 12, 1901, *Fink 536* (MIN); on bark, Flag Island, Aug. 1897, *Millan & Sheldon* (MIN); on dead pine, 1900, *Fink* (F).

IOWA: BREMER CO.: on trees, July 1894, *Fink* (MIN).

SOUTH DAKOTA: MEAD CO.: Piedmont, 1892, *Pratt* (F).

MONTANA: LEWIS AND CLARK CO.: on forest duff and humus, sect. 7-8 T. 12 W. R. 9W., Helena Forest, *Flint* (MONT). MISSOULA CO.: Mitten Mountain, near Missoula, elev. 4000 ft., Dec. 1930, *Flint* (MONT); Pattee Canyon, close to slaughterhouse, Jan. 15, 1934, *Flint* (MONT); on alder stem, Pattee Canyon, near Missoula, elev. 3500 ft., May 1, 1935, *Flint* (MONT); on granite rocks, sheltered spots, Black Bear Mountain, Bitterroot Mountains, Aug. 14, 1931, *Flint* (MONT).

WYOMING: CROOK CO.: Sundance Mountain, July 3, 1896, *A. Nelson* (MBG); Hayden Expedition, 1872, *J. M. Coulter* (US).

COLORADO: WELD CO.: over siliceous rocks and mosses, south St. Vrain Canyon, elev. 7200 ft., Oct. 7, 1936, *Kiener* (MBG).

NEW MEXICO: COLFAX CO.: moist bank, vicinity of Ute Park, Aug. 29, 1916, *Standley* (F).

IDAHO: NEZ PERCE CO.: elev. 1000 ft., Apr. 30, 1896, *Heller & Heller* (MBG, MIN).

BRITISH COLUMBIA: on the old wharf, Comox, Vancouver Island, June 24, 1893, *Macoun* (MBG,US); on trees and old fences, Victoria, May 1893, *Macoun* (F).

WASHINGTON: ISLAND CO.: on rocks, Langley, May 1920, *Grant* (WIS); on log, Langley, 1923, *Grant* (WIS); on *Tsuga* log, Oct. 1922, Langley, *Grant* (WIS); on limbs of trees, Langley, 1921, *Grant 232* (F). SAN JUAN CO.: San Juan, July 27, 1906, *Fink* (FM).

OREGON: MULTNOMAH CO.: on bark of maple, Portland, Apr. 29, 1906, *Foster* (F).

CALIFORNIA: SANTA CRUZ CO.: on sandstone, Devil's Canyon, elev. 2300 ft., July 28, 1905, *Herre 702* (MIN).

FOREIGN AND LOCAL EXSICCATAE EXAMINED: Claud. 17; Elenk. 106a, b; Harm. Lich. Loth. 297; Hav. 180; Johns. 69; Malme 230; Merr. 27; Mudd, 66; Salw. 168.



**23. *Parmelia Herrei*** Zahlbr. apud Herre, Proc. Wash. Acad. Sci. 7: 353. 1903.

The type was collected on earth and sandstone, Pilarcitos Creek Canyon, 2 miles from the ocean, in San Mateo County, California, by A. C. Herre, and is now in the United States National Herbarium.

Thallus gray to yellowish-gray in herbarium material, lobes long, narrow, tips rounded or wavy, somewhat soresiate, center of thallus becoming imbricate with the tangling of the lobes, margin fringed with long black cilia, below densely covered with long black rhizinae; apothecia not known; K, none, C, brown, K + C, none, P, none.

Algal layer continuous, 15–18  $\mu$  thick, upper cortex 34–38  $\mu$  thick, matrix light-colored; medulla loosely interwoven; lower cortex 18–26  $\mu$  thick, matrix black; thallus 66–90  $\mu$  thick.

The plant resembles *P. saxatilis* but is more rugged in appearance. It has been collected only from the type locality and by A. C. Herre.

Distribution: Plant unknown except in type locality.

CALIFORNIA: SAN MATEO CO.: on earth and sandstone, Pilarcitos Creek Canyon, 2 miles from the ocean, elev. 200 ft., May 28, 1904, *Herre* (Type collection) (US); on earth and sandstone, Pilarcitos Creek Canyon, 2 miles from the ocean, elev. 200 ft., June 30, 1906, *Herre* (MBG,F,MIN,LSU,M).

**24. *Parmelia Borreri*** Turn. apud Sm. & Sowerb., Eng. Bot. 25: tab. 1780. 1807.

*Lichen Borreri* Sm. apud Sm. & Sowerb., Eng. Bot. 25: tab. 1780. 1807.

*Parmelia Borreri* var. *hypomela* Tuck., Syn. N. Amer. Lich. 1: 58. 1882.

The plants used as types by both Turner and Smith are unknown, though their material came from Sussex, England. The plates cited by Smith in Smith and Sowerby's 'English Botany' 25: t. 1780. 1807, and Turner, 'Transactions Linnean Society London' 9: tab. 13, f. 2. 1808, are well made and represent the descriptions of the plants. Tuckerman's type of the variety is a collection made in Illinois and is in his herbarium at the Farlow.

Thallus light grayish-green to olive-green, adnate, wrinkled,



margins of lobes round and usually wavy, from which short flat dichotomously branched sorediate lobules arise, surface of thallus glaucous, black ostioles of the spermagonia prominent on the younger portions of the upper surface; lower surface, dirty white to dark brown, with numerous white or darkening rhizinae; apothecia numerous, sessile or short-pedicellate, 0.5–14 mm. diameter, disks deeply to slightly concave, chestnut-brown to dark brown, margins regular with vertical grooves marking the outside of the amphithecia, occasionally sorediate; K, upper cortex yellow, medulla none; C, medulla red; K + C, none; P, none.

Algal layer continuous, 20–31  $\mu$  thick; upper cortex 20–24  $\mu$  thick; medullary hyphae loosely interwoven, hyaline; lower cortex 20–30  $\mu$  thick; ascus clavate, spores 8, 8–10  $\times$  10–12  $\mu$ ; thecium 60–96  $\mu$  thick; thallus 400–600  $\mu$  thick.

Distribution: Vermont to North Carolina, west to British Columbia and California.

ONTARIO: on trunks, Algonquin Park, May 27, 1900, *Macoun 241* (MBG,US).

VERMONT: ADDISON CO.: on *Abies canadensis*, Monkton, Dec. 2, 1878, *Faxon* (MBG).

MASSACHUSETTS: MIDDLESEX CO.: Blue Hills, Nov. 6, 1883, *Faxon* (WIS). NORFOLK CO.: Weymouth, *Willey* (BSNH).

NORTH CAROLINA: BUNCOMBE CO.: on trees, Asheville, Feb. 1899, *C. Russell* (M).

MICHIGAN: EMMET CO.: Harbor Springs, Sept. 1931, *Mains* (M).

INDIANA: UNION CO.: on bark, July 25, 1917, *Fink & Funston 75* (F).

WISCONSIN: BURNETT CO.: valley of the Wisconsin River near Webster, summer 1894, *Cheney* (WIS). ONEIDA CO.: Aug. 27, 1936, *Peck* (MBG). GREEN LAKE CO.: on shagbark hickory, above granite outcrop, 2 miles south of Marquette, Sept. 4, *Shinners* (WIS).

ILLINOIS: COOK CO.: on oaks, *Calkins* (NYBG); River Forest, June 22, 1893, *Harper & Harper* (FM); on bark of trees, Palos Park, May 30, 1900, *Harper & Harper 99* (FM). CHAMPAIGN CO.: on oak trunks, Urbana, Feb. 8, 1879, *Earle* (NYBG). LASALLE CO.: on oaks, *Calkins 2* (F). MENARD CO.: on old fences, Athens, *Hall* (FM); Athens, 1878, *Hall* (Type of Tuckerman's variety) (MBG).

KENTUCKY: MADISON CO.: glade, 10 miles north of Richmond, Aug. 18, 1937, *Hubricht B199* (MBG).

MINNESOTA: HENNEPIN CO.: on bark, Lake Harriet, Apr. 1890, *Frost* (MIN). BLUE EARTH CO.: on trees, Mankato, June 22, 1899, *Fink 11* (MIN). BELTRAMI CO.: on trees, Red Lake, July 26, 1900, *Fink 893* (MIN); on pines, Bemidji, July 11, 1901, *Fink 658* (MIN). MEEKER CO.: on bark, Litchfield, June 1892, *Frost F46* (MIN). REDWOOD CO.: on rocks, Redwood Falls, July 8, 1899, *Fink 335* (MIN). OTTERTAIL CO.: on trees, Leaf Hills, June 27, 1900, *Fink 281* (MIN); on trees, Battle Lake, June 20, 1900, *Fink 43* (MIN). PENNINGTON CO.: on trees, Thief River Falls, July 19, 1900, *Fink 824* (MIN); Red River, May 1856, *Lapham* (WIS).



IOWA: CLAYTON CO.: on trees, Apr. 1894, *Fink* (WIS); on trees, Sept. 1894, *Fink* (MBG). JOHNSON CO.: Iowa City, 1885, *Macbride* (IA); on *Quercus alba*, March 13, 1896, *Fitzpatrick & Fitzpatrick* (FM). FAYETTE CO.: on trees, Sept. 20, 1892, *Fink* (MBG).

MISSOURI: ST. LOUIS CO.: bark of tree, Allenton, May 5, 1938, *Berry* (MBG); bark of tree, 2 miles southeast of Centaur Station, Jan. 1, 1937, *Hubricht 817* (MBG). IRON CO.: on granite rocks, Buford Mountain, Nov. 1897, *C. Russell 4* (MBG). BOONE CO.: bark of tree, Sept. 17, 1930, *Berry* (MO,MBG). MORGAN CO.: bark of hickory tree, Oct. 25, 1930, *Berry* (MO,MBG). SALINE CO.: fence rails, Emma, 1892, *Demetrio* (MBG). JOHNSON CO.: bark of tree, Warrensburg, Jan. 3, 1938, *Berry* (MBG).

NORTH DAKOTA: CASS CO.: on trees, Fargo, June 1914, *Brenckle 1015* (F).

SOUTH DAKOTA: BROOKINGS CO.: trees and dead wood, Brookings, June 13, 1891, *Luke* (MBG); on elm trees, Brookings, Apr. 1895, *Williams 155* (MBG,WIS,MIN,FM).

TEXAS: GILLESPIE CO.: *Jermy* (MBG). LIMESTONE CO.: Grossbeck Mountain, summer 1931, *Jones & Hedrick* (M); *C. Wright*, 1848-50 (T). REAL CO.: shade, Frio Canyon, 11 miles north of Leakey, May 23, 1938, *Hubricht B777* (MBG). DENTON CO.: in group of "*Quercina minor*," 3 miles southwest of Denton, Feb. 1935, *Bussard V* (MBG).

BRITISH COLUMBIA: on old wharf, Comox, June 24, 1893, *Macoun 149* (MBG).

CALIFORNIA: SANTA CRUZ CO.: on oaks, Ano Nuevo Creek, Santa Cruz Mountains, Aug. 9, 1906, *Herre* (MBG,LSU).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Malbr. Lich. Nor. 269; Harm. Lich. Loth. 294; Flag. Lich. Fr.-C. 73; Mus. Krypt. Exs. Vind. 3163; Moug. & Nest. 634; Cum. Lich. Bor. Am. 85, 165.

The citation of *Parmelia dubia* by Schaerer as a synonym of *Parmelia Borreri* was evidently based on a typographical error. *Lichen dubius* Wulf. apud Jacq. (Collectanea 4: 275, t. 19, f. 1. 1790) has powdery soredia on the margins and clearly is not the plant described as *P. Borreri* by Turner.

## 25. *Parmelia Bolliana* Müll.-Arg., Flora 60: 78. 1877.

The type was collected by J. Boll in Van Zandt County, Texas, and sent to Müller-Argau for determination. It is now in the Herbarium Boissier, Université de Genève, Switzerland.

Thallus greenish-brown, much wrinkled, with reticulate secondary ridges, many little white dots where the upper cortex has been lost and the white medulla is exposed, lobes short and round, margins smooth; under surface white at the margin, becoming light brown beneath, with thinly scattered, small, light brown rhizinae; apothecia numerous, 1-2 mm. diameter, sessile, deeply concave to almost flat, disks chestnut-brown; amphithe-



cium marked with deep vertical lines or ridges; K, none, C, none, K + C, pink, P, none.

Algal layer continuous, 20–25  $\mu$  thick; upper cortex 20–22  $\mu$  thick; medulla loosely interwoven, diameter of hyphae 1.1–2  $\mu$ ; lower cortex 20–25  $\mu$  thick, matrix light-colored; thallus 400–570  $\mu$  thick; ascus clavate, spores 8, 7–9  $\times$  12–14  $\mu$ ; paraphyses branched.

Distribution: Missouri, Texas, and Arkansas.

MISSOURI: WAYNE CO.: on trees, Clark Mountain, Nov. 1, 1898, *C. Russell* (MBG).

ARKANSAS: BOONE CO.: rocky wooded bluff, above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

TEXAS: VAN ZANDT CO.: on trees, *J. Boll* (Co-type) (T). GILLESPIE CO.: *Jermy* (MBG). BREWSTER CO.: full sun to semi-shade, 18 miles south of Marathon, May 27, 1938, *Hubricht B853* (MBG). CULBERSON CO.: full sun to semi-shade, north side of summit, Van Horn Mountains, 15 miles south of Van Horn, June 2, 1938, *Hubricht B946* (MBG).

**26. *Parmelia quercina* (Willd.) Wainio, Termeszetr. Fuze-tek 22: 279. 1899.**

*Lichen quercinus* Willd., Fl. Berol. Prodr. 353. 1787; Ach., Lich. Suec. Prodr. 124. 1798.

*Lichen tiliaceus* Hoffm., Enum. Lich. 97. 1784.

*Parmelia tiliacea* Ach., Meth. Lich. 215. 1803, not *Lobaria tiliacea* Hoffm.

*Imbricaria quercina* DC. apud Lam. & DC., Fl. Fr. ed. 3, 2: 390. 1815.

Willdenow used *Lichen quercinus* to designate this lichen in 'Florae Berolinensis Prodromus,' 353. 1787. Hoffmann, in his 'Deutschlands Flora' 2: 149. 1795, designates it *Lobaria tiliacea* and cites his 'Enumeratio Lichenum,' t. 16, f. 2. 1784, where the epithet *Lichen tiliaceus* was used. Hoffmann cites Willdenow and considers *Lichen quercinus* as synonymous with *Lobaria tiliacea*. Acharius (Lichenographiae Suecicae Prodromus, 124. 1798) uses the epithet *Lichen quercinus* of Willdenow, considering Hoffmann's *Lichen tiliaceus* as belonging to another plant. He questioned the identity of *Lobaria tiliacea* given by Hoffmann (Deutschl. Fl. 2: 149. 1795) as a synonym of *Lichen quercinus* Ach. (Lich. Suec. Prodrom. 124. 1798). In his 'Meth. Lich.' 215. 1803, Acharius applied the epithet *Parmelia tiliacea*, citing *Lichen quercinus* Willd. (Fl.



Berol. Prodr. 353. 1787), but considering the figure and description in Hoffmann's 'Enum. Lich.' 1784, as that of *Lichen scorteus*. This would make Willdenow's 'Florae Berolinensis Prodr.' 353. 1787, the oldest valid description of the plant, and his name, *quercinus*, should be used. Willdenow's collections were from the vicinity of Berlin, and his type is in Berlin. Acharius' herbarium, at Helsinki, contains collections of the species which he determined. Except for the plates, there seems to be none of Hoffmann's material left. DeCandolle (Fl. Fr. ed. 3, 2: 390. 1815) cites *Lichen quercinus* (Willd., Fl. Berol. Prodr. t. 7, f. 13. 1787; and Ach., Lich. Suec. Prodr. 124. 1798) as synonymous with his plant. DeCandolle's specimens are in Genève, Switzerland.

Thallus 5–15 cm. diameter, closely adnate, usually wrinkled at the center, greenish-gray, lobes short and round, occasionally elongated and subdichotomously branched, margins irregular, crenate; apothecium sessile, 4–12 mm. diameter, disk slightly to deeply concave, light chestnut-brown; amphithecium entire or dissected; K, upper cortex yellowish-green, medulla greenish; C, none, K + C, none, P, yellow.

Algal layer continuous, 48–52  $\mu$  thick; upper cortex 10–16  $\mu$  thick, matrix yellow-brown; medulla loosely interwoven, hyphae hyaline and of small diameter; lower cortex 40–44  $\mu$  thick, matrix black; thallus 288–300  $\mu$  thick; thecium 24–28  $\mu$  thick; ascus clavate, spores 8, 4–5  $\times$  6–8  $\mu$ ; paraphyses branched, enlarged at tips.

Distribution: New Brunswick to Florida, west to Wyoming and California.

NEW BRUNSWICK: on trees, *Willey* (BSNH).

ONTARIO: on tree trunks in wood, Ottawa, May 2, 1900, *Macoun* (MBG); on tree trunks, Ottawa, June 24, 1898, *Macoun* (MBG); on trees, Emo, July 18, 1901, *Fink 693* (MIN).

MAINE: WASHINGTON CO.: June 1929, *Markin* (WIS). AROOSTOOK CO.: St. Francis, Aug. 1893, *Cummings 102* (MIN). PISCATAQUIS CO.: on high river bluffs with red maple, poplar, and balsam, Camp Sunday, Medford Township, Aug. 28, 1905, *Merrill* (NYBG). KNOX CO.: on various trees, Warren, Apr. 30, 1911, *Merrill 221* (MIN).

NEW HAMPSHIRE: COOS CO.: Shelburne, Aug. 1894, *Farlow* (FM); on pine trees, base of Mount Washington, Aug. 6, 1895, *Harper & Harper* (FM).

VERMONT: ADDISON CO.: on dead wood, Middlebury, Apr. 22, 1913, *Dodge* (D).



RUTLAND CO.: on maple tree, Pawlet, Mar. 22, 1913, *Dodge* (D); Chipman Lake, Tinmouth, June 1938, *Dodge* (D).

MASSACHUSETTS: NORFOLK CO.: Hazelwood, Mar. 20, 1882, *Faxon* (WIS). BRISTOL CO.: stones in wall, New Bedford, 1878, *Willey* (US); bark of trees, New Bedford, *Willey* (MIN,MBG); New Bedford, 1862-1898, *Willey* (US); trunks, New Bedford, *Willey 32* (FM). COUNTY INDEFINITE: New England Lichens, *Wright* (MBG).

NEW YORK: QUEENS CO.: on *Acer*, East Port, Long Island, June 26, 1894, *Schrenk* (US). YATES CO.: Penn Yan, *Buckley* (MBG); Dundee, *S. Wright 40* (FM).

PENNSYLVANIA: MIFFLIN CO.: Sept. 1879, *Rothrock* (FM). CHESTER CO.: June 27, 1879, *Rothrock & Rothrock* (FM).

MARYLAND: MONTGOMERY CO.: rock outcrop, cliffs near Cabin Hill, Plummers Island, Potomac River, near Cabin John, Nov. 6, 1938, *Leonard 2821* (US); base of oaks, West Knob, Plummers Island, Potomac River, near Cabin John, Nov. 6, 1938, *Leonard 2775* (US); rock outcrop, West Knob, Plummers Island, Potomac River, near Cabin John, Nov. 6, 1938, *Leonard 2764* (US).

VIRGINIA: PRINCE WILLIAM CO.: on old walnut logs near ruins of old house, between High Point Ridge and ridge east, Bull Run Mountain, June 23, 1937, *Allard 77632* (US). LEE CO.: edge of woods, Hunter's Gap, Powell Mountain, 2.7 miles north of Blackwater, Aug. 23, 1937, *Hubricht B412* (MBG).

NORTH CAROLINA: HENDERSON CO.: bark of tree, Flat Rock, July 4, 1921, *Schallert 2026* (FM); base of tree, Grandfather Mountain, June 13, 1936, *Schallert* (MBG).

GEORGIA: THOMAS CO.: Thomasville, 1906, *Mrs. A. P. Taylor* (F).

FLORIDA: ORANGE CO.: on living cypress in swamp, Sanford, July 1906, *Rapp 17* (F). LEON CO.: Tallahassee, Nov. 1891, *Farlow* (F). COUNTY UNKNOWN: *Calkins 4* (MBG); Upsala, Nov. 1921, *Rapp 663* (F).

ALABAMA: MOBILE CO.: Mobile, *Mohr* (US). MARSHALL CO.: open woods, 3 miles north of Boaz, July 21, 1939, *Hubricht B1543* (MBG).

OHIO: ATHENS CO.: on oak, Sept. 22, 1938, *Wolfe 257* (O). PERRY CO.: on tree, Apr. 4, 1936, *Wolfe 546* (O). VINTON CO.: on maple, Mar. 14, 1936, *Wolfe 513* (O). PICKAWAY CO.: on locust, Apr. 19, 1936, *Wolfe 631* (O). PIKE CO.: on linden, Sept. 15, 1935, *Wolfe* (NYBG); on linden, Sept. 15, 1935, *Wolfe 215* (O). JACKSON CO.: on dead branch, Nov. 3, 1935, *Wolfe 335* (O). CLERMONT CO.: on bark, Apr. 18, 1936, *Wolfe & Hill 610* (O). COUNTY UNKNOWN: on a poke tree, Apr. 12, 1918, *Fink* (D).

MICHIGAN: COUNTY UNKNOWN: on trees, Sailors Encampment, Aug. 3, 1897, *Harper & Harper 55* (FM).

KENTUCKY: LAUREL CO.: deep wet woods, 8.4 miles north of East Bernstadt, Aug. 18, 1937, *Hubricht B280* (MBG). KNOX CO.: 1.4 miles north of Jarvis Store, Aug. 19, 1937, *Hubricht B316* (MBG).

TENNESSEE: HAMILTON CO.: on elms, Chattanooga, *Calkins 4* (FM); on trees, Missionary Ridge, *Calkins 1* (MIN). SEVIER CO.: woods, elev. 3600 ft., "The Loop," 10 miles south of Gatlinburg, Aug. 25, 1937, *Hubricht B518* (MBG).

WISCONSIN: VILAS CO.: valley of the Wisconsin River, near Lac Vieux Desert, Summer 1893, *Cheney 41* (WIS). PORTAGE CO.: valley of the Wisconsin River, near Stevens Point, Summer 1894, *Cheney 3498* (WIS). TAYLOR CO.: valley of the Wisconsin River near Goodrich, Summer 1894, *Cheney* (WIS).



ILLINOIS: LAKE CO.: on oak, Lake Bluff, May 1906, *Harper & Harper 100* (FM). LASALLE CO.: on trees, *Calkins* (F,FM). MENARD CO.: on trees, 1878, *Hall* (FM); Athens, 1878, *Hall* (MIN,MBG,WIS).

MINNESOTA: COOK CO.: on cedar, Grand Marais, Aug. 22, 1902, *Fink 156* (MIN). LAKE CO.: on trees, Beaver Bay, July 14, 1897, *Fink 724* (MIN); on trees, Snowbank Lake area, July 23, 1897, *Fink 896* (MIN). ST. LOUIS CO.: on bark of *Fraxinus*, Vermillion Lake, July 19, 1886, *Bailey & Holway A226* (MIN); on trees, Ely, July 28, 1897, *Fink 1018* (MIN); on trees, Harding, Aug. 17, 1901, *Fink 1560* (MIN); on trees, Tower, Aug. 23, 1901, *Fink 1698* (MIN). CARLTON CO.: on trees, Kettle Falls, Aug. 13, 1901, *Fink 1417* (MIN); on trees, Tafte, Carlton Peak, July 10, 1897, *Fink 620* (MIN). KOOCHICHING CO.: on trees, Koochiching, July 26, 1901, *Fink 922* (MIN); on trees, Gunflint, July 2, 1897, *Fink 407* (MIN). AITKIN CO.: on *Pinus Strobus*, Mille Lacs Indian Reservation, June 1892, *Sheldon S2328* (MIN); on *Quercus macrocarpa*, Mille Lacs Lake, June 1, 1892, *Sheldon S2289* (MIN). CROW WING CO.: on *Quercus tinctoria*, Garrison, June 1892, *Sheldon S2236* (MIN). BLUE EARTH CO.: on trees, Mankato, June 23, 1899, *Fink 56* (MIN). BELTRAMI CO.: on oaks, Bemidji, July 4, 1900, *Fink 449* (MIN); on trees, Red Lake, July 31, 1900, *Fink 1003* (MIN); on balsam in swamp, Beaudette, June 18, 1901, *Fink 9* (MIN). MARSHALL CO.: on trees, Thief River Falls, July 23, 1900, *Fink 874* (MIN). OTTERTAIL CO.: on trees, Leaf Hills, June 26, 1900, *Fink 208* (MIN); on trees, Battle Lake, June 18, 1900, *Fink 16* (MIN).

IOWA: JOHNSON CO.: on bark, Jan. 8, 1898, *Fink & Savage* (IA). HENRY CO.: on bark, Jan. 1898, *Savage* (IA). BREMER CO.: on trees, Aug. 29, 1895, *Fink* (D). FAYETTE CO.: on trees, Sept. 1892, *Fink* (MBG,WIS).

MISSOURI: ST. LOUIS CO.: Cliff Cave, Aug. 26, 1899, *Norton* (US); on *Crataegus tomentum*, covering the branches, Crescent, May 1896, *C. Russell* (MBG); bark of oak tree, Ranken Estate, Nov. 20, 1936, *Berry* (MBG). ST. FRANCOIS CO.: on bark of trees, Pickle Springs, May 21, 1938, *Berry* (MBG). WAYNE CO.: on oak trees, Clark Mountain, Mar. 16, 1892, *C. Russell* (US). BUTLER CO.: on bark of *Ostrya*, Neelyville, Dec. 25, 1898, *C. Russell* (MBG).

ARKANSAS: BAXTER CO.: dry upland woods, 1 mile west of Big Flat, Apr. 9, 1939, *Dodge, Berry & Johnson* (MBG). SEARCY CO.: open wooded hillside, 4 miles west of Marshall, Apr. 9, 1939, *Dodge, Berry & Johnson* (MBG). BOONE CO.: rocky wooded bluff above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). NEWTON CO.: steep dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); moist woods on gentle slope near Marble Falls, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG). GARLAND CO.: on dead oak tree, Carpenters Road, Hot Springs, June 30, 1939, *Scully 1342* (MBG); on dead branches, North Mountain, Hot Springs, Dec. 15, 1939, *Scully 1407* (MBG).

TEXAS: GALVESTON CO.: Galveston, *Hall 362* (FM).

WYOMING: CROOK CO.: Sundance Mountain, July 3, 1896, *A. Nelson* (MBG).

CALIFORNIA: SANTA CLARA CO.: trees and shrubs, summit of Black Mountain, elev. 2785 ft., July 6, 1903, *Herre* (US). RIVERSIDE CO.: on oak, San Jacinto Mountains, elev. 1600 m., 1903, *Hasse 187* (MIN).

FOREIGN AND LOCAL EXSICCATAE EXAMINED: Claud. 506; Cum. I, 23, 102, II, 23; Elenk. 5; Erb. I, 465; Flag. Alg. 11; E. Fries, 169; Funck, I, 141; Lojk. Univ. 62; Stenh. 154; *P. quercina* var. *scortea* Claud. 117; Erb. I 931; Flag. Lich. Fr.-C. 72; Tuck. III & IV, 70; *P. quercina* var. *sublaevigata* Bal. 4176, 4210; Spruce, 136, 156; *P. quercina* var. *vicinior* Merr. 221.



27. *Parmelia texana* Tuck., Am. Jour. Arts & Sci. II. 25: 424. 1858.

Tuckerman's type was based on *Charles Wright 228*, from Blanco, Texas. The type is now in the Tuckerman Herbarium.

Thallus light greenish-gray, wrinkled and covered with many small powdery soredia, margins of lobes round and irregular; lower surface black, margins lighter, with papillose rhizinae toward the center; apothecium sessile, 1–6 mm. diameter, disk concave, chestnut-brown, amphithecium thick, wavy, and more or less sorediate; K, none, C, none, K + C, brown, P, none.

Algal layer discontinuous, groups of algae 40–42  $\mu$  in diameter; thickness of upper cortex 20–21  $\mu$ , of lower cortex 20–21  $\mu$ ; medulla of loosely interwoven hyaline hyphae; thallus 700–712  $\mu$  thick; thecium 88–90  $\mu$  thick, ascus clavate, spores 8, 2–4  $\times$  7–12  $\mu$ ; paraphyses unbranched and slightly inflated at the tips.

Distribution: South Carolina to Florida, west to Oklahoma and Texas.

SOUTH CAROLINA: COUNTY UNKNOWN: *Curtis* (NYBG).

GEORGIA: THOMAS CO.: Thomasville, Aug. 1906, *Taylor* (F).

FLORIDA: ORANGE CO.: on oak trunks, Sanford, Nov. 1906, *Rapp 19* (F); on *Sabal Palmetto*, Mar. 7, 1910, *Rapp* (BPI,F); Sanford, Jan. 1911, *Rapp 42* (F); on *Magnolia glauca*, Sanford, Apr. 1911, *Rapp 39* (F); Sanford, Apr. 1922, *Rapp 323* (F).

ALABAMA: LEE CO.: on fence rail, Auburn, Mar. 21, 1897, *Earle & Baker* (MBG, MIN).

OHIO: BROWN CO.: on fence, Apr. 18, 1936, *Wolfe & Hill 605* (O). CLERMONT CO.: on oak, Apr. 18, 1936, *Wolfe & Hill 609* (O). CLINTON CO.: on tree, Apr. 18, 1936 *Wolfe & Hill 626* (O). FAIRFIELD CO.: on rock, Apr. 27, 1935, *Wolfe 93* (O). MARION CO.: June 30, 1892, *Bogue* (O). PIKE CO.: on oak, Sept. 15, 1935, *Wolfe 209* (O). UNION CO.: on maple, May 3, 1936, *Wolfe & Hartley 657* (O). VINTON CO.: on red maple, Mar. 14, 1936, *Wolfe 474* (O). WARREN CO.: on hickory, Apr. 18, 1936, *Wolfe & Hill* (O).

KENTUCKY: KNOX CO.: open woods, 1.4 miles north of Jarvis Store, Aug. 10, 1937, *Hubricht B283, B321* (MBG).

TENNESSEE: HAMILTON CO.: on rocks, Lookout Mountain, *Calkins 204* (NYBG).

ARKANSAS: CHICOT CO.: near Macon, Dec. 29, 1938, *Anderson* (MBG).

OKLAHOMA: NOBLE CO.: on dead juniper, Fort Bliss, Apr. 18, 1917, *Mrs. J. Clemens* (MBG).

TEXAS: HARRIS CO.: on living *Quercus Phellos*, Houston, Jan. 9, 1939, *Fisher 392* (MBG). BLANCO CO.: on dead wood, Blanco, *Fink 11,427* (M); Blanco, *Wright 228* (Type collection) (T).



28. *Parmelia rudecta* Ach., Syn. Meth. Lich. 197. 1814.

*Parmelia Borreri* var. *rudecta* Tuck., Enum. N. Amer. Lich. 49. 1845.

*Parmelia leiocarpa* Tayl., Hook. London Jour. Bot. 6: 170. 1847.

Acharius' type description was from a collection of Muhlenberg's made in Pennsylvania. Tuckerman's type of the variety was based on a collection from the White Mountains of New Hampshire, which is in his herbarium at the Farlow. Taylor's *P. leiocarpa* was based on a North American collection and is now in his herbarium at the Boston Society of Natural History. *Parmelia rudiata* Eaton (Manual of Botany for North America, ed. 6, pt. 2:56. 1833) is a typographical error which appeared in the sixth edition and was continued through the eighth edition. Previous to the sixth edition Eaton used *Parmelia rudecta*.

Thallus olive-green or lighter, wrinkled, loosely adnate, older portions covered with confluent soredia, granular isidia, or coralloid branchlets, lobes round, margins entire or slightly dissected; lower surface white to light brown or darker; apothecium 3–5 mm. diameter, sessile, disk deeply concave, chestnut-brown, amphithecium entire, wavy or irregular; K, upper cortex yellow, medulla none; C, upper cortex none, medulla red; K + C, yellow; P, gray.

Algal layer continuous, 42–45  $\mu$  thick; thickness of upper cortex 18–23  $\mu$ ; medullary hyphae loosely interwoven, large, 3–4  $\mu$  in diameter; thickness of lower cortex 65–84  $\mu$ , thickness of thallus 400–810  $\mu$ ; thecium 60–67  $\mu$  thick, ascus clavate, spores 8, 8–10  $\times$  10–12  $\mu$ .

Distribution: Nova Scotia to Florida, west to Washington.

NOVA SCOTIA: on tree, Sandy Cove, Aug. 1908, *Lowe* (F); *Rothrock* (FM).

QUEBEC: on oak trunk, Hull, Sept. 28, 1907, *Macoun* (F); adherent to rocks, Ste. Anne, May 2, 1935, *Lepage 137* (D); on trees, Ste. Anne, May 5, 1935, *Lepage 142* (D).

ONTARIO: on bark of trees, Ottawa, Apr. 20, 1891, *Macoun 85* (MIN, MBG, WIS); on trunks and old rails, Ottawa, Oct. 15, 1893, *Macoun 40* (MBG); on ground, fallen trees, base of trees, in shaded parts of woods, Rainy Lake, Aug. 20, 1930, *Schmidt 11* (US); on rocks, Emo, July 20, 1901, *Fink 777* (MIN).

MAINE: HANCOCK CO.: on paths to cliffs, Seal Harbor, Sept. 20, 1894, *Merrill*



(D). KNOX CO.: on old birch trunks, Thomaston, Apr. 1912, *Merrill 2* (MBG). OXFORD CO.: on black ash, Buckfield, July 16, 1924, *Parlin 7419* (F).

NEW HAMPSHIRE: COOS CO.: White Mountains, *Tuckerman* (Type of *P. Borreri* var. *rudecta*) (T).

VERMONT: LAMOILLE CO.: on maple tree, Cambridge, June 21-24, 1922, *Dutton 1713* (MBG). WINDHAM CO.: on apple tree, Pike Hollow, Wardsboro, July 3, 1935, *Moore* (MBG). ADDISON CO.: over ledges, Mud Pond, Leicester, Aug. 28, 1922, *Dutton 1878* (F). RUTLAND CO.: on cedar tree in swamp, elev. 475 ft., Brandon, Feb. 26, 1921, *Dutton* (WIS,FM).

MASSACHUSETTS: BARNSTABLE CO.: on limb of white oak, West Falmouth, Apr. 11, 1937, *Linder* (F). BRISTOL CO.: on trunks, New Bedford, *Willey 26* (MBG).

CONNECTICUT: WINDHAM CO.: on trees, Woodstock, Oct. 29, 1925, *Evans* (F).

NEW YORK: QUEENS CO.: on trees, Long Island, 1914, *Lathrow 27* (F). YATES CO.: Dundee, *Samuel Wright* (FM).

PENNSYLVANIA: CHESTER CO.: on chestnut rail, Nov. 27, 1897, *Rothrock & Rothrock* (FM). LANCASTER CO.: along fence rails, Lancaster, Mar. 14, 1894, *Eby* (MBG); along mill creek, Lancaster, Nov. 22, 1892, *Heller* (F); on red cedar trees, Bear Town, Sept. 16, 1895, *Eby* (US); on trees, Rheinholds, Sept. 23, 1894, *Eby* (US); on tree, Bear Town, July 11, 1894, *Eby* (MBG); on tree, Apr. 1896, *Eby* (MBG). PIKE CO.: Matamoras, Sept. 24, 1896, *Schneider* (MBG).

MARYLAND: PRINCE GEORGES CO.: base of juniper tree, pine barren, southeast of Decatur Heights, Bladensburg, Sept. 26, 1938, *Leonard* (US). MONTGOMERY CO.: logs and bases of trees, Takoma Park, 1896, *Williams* (MBG,MIN,WIS); hickory tree, Plummers Island, Nov. 6, 1938, *Leonard* (US).

NORTH CAROLINA: STOKES CO.: on bark of trees, Germantown Road, Mar. 1, 1922, *Schallert 971* (WIS). FORSYTH CO.: Bennetts Rock, Apr. 10, 1936, *Schallert* (MBG).

SOUTH CAROLINA: COUNTY UNKNOWN: *Ravenel* (US).

GEORGIA: THOMAS CO.: Thomasville, Aug. 17, 1906, *Taylor* (F).

FLORIDA: ORANGE CO.: on trunks of trees, Sanford, Mar. 1910, *Rapp 40.11* (F).

ALABAMA: MARSHALL CO.: open woods, 3.2 miles north of Boaz, July 21, 1939, *Hubricht B1546* (MBG).

MISSISSIPPI: DE SOTO CO.: 2 miles north of Coldwater, Dec. 28, 1938, *Anderson* (MBG).

OHIO: VINTON CO.: on red maple, Mar. 14, 1936, *Wolfe 474* (O). HOCKING CO.: on tree trunk, Dec. 9, 1934, *Wolfe* (NYBG); PIKE CO.: on oak, Sept. 15, 1935, *Wolfe 209* (O). FRANKLIN CO.: Georgesville, July 15, 1892, *Bogue* (W). UNION CO.: on maple, May 3, 1936, *Wolfe 657* (O). CLARK CO.: Springfield, Feb. 9, 1877, *Biddlecome* (W). CLINTON CO.: on tree, Apr. 18, 1936, *Wolfe 626* (O). BROWN CO.: on fence, Apr. 18, 1936, *Wolfe 605* (O). FAIRFIELD CO.: on rock, Apr. 27, 1935, *Wolfe 93* (O). CLERMONT CO.: on oak, Apr. 18, 1936, *Wolfe 609* (O). WARREN CO.: on hickory, Apr. 18, 1936, *Wolfe & Hill 624* (O).

WEST VIRGINIA: LOGAN CO.: on Peach Creek, Pulaski, *Cummings* (W).

MICHIGAN: CHEBOYGAN CO.: on *Betula*, Pap Island, vicinity of Burt and Douglas lakes, June-Aug. 1922, *Nichols* (F).

INDIANA: FRANKLIN CO.: on wood near Brookville, July 25, 1917, *Fink* (D). KNOX CO.: edge of woods, 1.3 miles east of Frichton, Aug. 16, 1937, *Hubricht B161* (MBG).



KENTUCKY: BALLARD CO.: Kevil, Apr. 1936, *Fassett* (WIS). ROCKCASTLE CO.: bark of trees, open pine woods near Rockcastle River east of Livingston, Aug. 18, 1937, *Hubricht B238* (MBG).

TENNESSEE: SEVIER CO.: semi-shade, boulders in stream bed, elev. 3600 ft., "The Loop," 10 miles south of Gatlinburg, Aug. 25, 1937, *Hubricht B507* (MBG).

HAMILTON CO.: on pine tree, Lookout Mountain, *Calkins 3* (F).

WISCONSIN: DODGE CO.: northeast of Kekoskee, May 1936, *J. Thomson* (WIS). WAUSHARA CO.: sand plains south of Plainfield, Oct. 13, 1935, *J. Thomson* (WIS). MARQUETTE CO.: 12 miles east of Westfield, Oct. 13, 1935, *J. Thomson* (WIS). COLUMBIA CO.: Black Hawk Lookout, opposite Prairie du Sac, Sept. 28, 1935, *J. Thomson* (WIS). ADAMS CO.: Leola, Oct. 27, 1935, *J. Thomson* (WIS); bluffs of the Wisconsin River, Oct. 6, 1935, *J. Thomson* (WIS). BURNETT CO.: valley of the Wisconsin River, near Webster, summer 1894, *Cheney* (WIS).

ILLINOIS: LA SALLE CO.: on trees, *Calkins 401* (F). MENARD CO.: on fences and old wood, 1878, *Hall* (FM). COUNTY UNKNOWN: on limbs, Mar. 9, 1879, *Earle* (NYBG).

MINNESOTA: COOK CO.: on rocks, Grand Portage, June 24, 1897, *Fink 188* (MIN). LAKE CO.: on wood, Snowbank Lake, July 20, 1897, *Fink 839* (MIN). ST. LOUIS CO.: on rocks, Ely, July 28, 1897, *Fink 983* (MIN); on cedars, Tower, Aug. 26, 1901, *Fink 1788* (MIN). CARLTON CO.: on trees, Tafte, Carlton Peak, July 10, 1897, *Fink 612* (MIN); on rocks, Kettle Falls, Aug. 12, 1901, *Fink 1395* (MIN). KOOCHICHING CO.: on rocks, Rainy Lake City, Aug. 3, 1901, *Fink 1136* (MIN); on cedars, Koochiching, July 29, 1901, *Fink 989* (MIN); on rocks, Gunflint, July 1, 1897, *Fink 369* (MIN). AITKIN CO.: on rocks, Palisades, July 15, 1897, *Fink 744* (MIN); on *Acer saccharum*, Mille Lacs Lake, June 1892, *Sheldon S2622* (MIN). BLUE EARTH CO.: on old wood and trees, Mankato, June 22, 1899, *Fink 12* (MIN); on trees, Mankato, June 23, 1899, *Fink 58* (MIN). BELTRAMI CO.: on cedars in swamps, Beaudette, June 22, 1901, *Fink 114* (MIN); on shaded granite, Bemidji, July 1900, *Fink 674* (MIN); on cedars in swamps, Beaudette, June 22, 1901, *Fink 111* (MIN). YELLOW MEDICINE CO.: on rocks and near trees, Granite Falls, July 11, 1899, *Fink 383* (MIN). ROSEAU CO.: on cedars in swamps, Warroad, June 29, 1901, *Fink 267* (MIN).

IOWA: IOWA CO.: on bark of various trees, north exposure, moist canyon Iowa River, Amana, May 30, 1937, *Kiener* (MBG).

MISSOURI: ST. CHARLES CO.: bark of tree, bluff of Missouri River, Mar. 12, 1938, *Berry* (MBG). ST. LOUIS CO.: on oak tree, Centaur, 5 miles beyond Clayton, Apr. 24, 1898, *Ferguson* (MBG); on boulders, Ranken Estate, Sept. 28, 1935, *Moore* (MBG). JEFFERSON CO.: on *Juniperus*, Herculaneum, Oct. 25, 1935, *Moore* (MBG). ST. FRANCOIS CO.: bark of trees, Pickle Springs, May 21, 1938, *Berry* (MBG). IRON CO.: Iron Mountain, July 17, 1915, *Emig* (MBG). FRANKLIN CO.: bark of tree, Missouri Botanical Garden Arboretum, Gray Summit, May 2, 1938, *Berry* (MBG); Boat Rock, Oct. 20, 1935, *Moore* (MBG); Elmont, May 20, 1914, *Emig* (MBG). CALLAWAY CO.: bark of tree, Sept. 25, 1930, *Berry* (MBG). MILLER CO.: bark of tree, Tavern Creek, Iberia, *Drouet* (MBG). GREENE CO.: on tree, rocky wooded bank of James River, 8 miles south of Springfield, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). JOHNSON CO.: bark of tree, Knobnoster, June 9, 1938, *Berry* (MBG).

ARKANSAS: WHITE CO.: near Judsonia, Dec. 28, 1938, *Anderson* (MBG). NEWTON CO.: top of dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8,



1939, *Dodge, Berry & Johnson* (MBG); high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); steep wooded slope with limestone bluff at top, 4 miles south of Boxley, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG). BOONE CO.: rocky wooded bluff above creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

TEXAS: HARRIS CO.: Houston, Feb. 24, 1917, *Fisher* (F); living tree, Harrisburg, Feb. 17, 1875, *Joor Herbarium* (MBG). BEXAR CO.: mesquite woods, 1.5 miles southeast of junction of Jolly Lane and Atkins-Elmendorf Lane, 18 miles east of San Antonio, May 17, 1939, *Hubricht B1887* (MBG).

WASHINGTON: JEFFERSON CO.: Olympic Mountains, 1915, *Grant* (F).

**29. *Parmelia reticulata* Tayl. apud Mack., Fl. Hibern. 2: 148. 1836.**

Taylor's type was a collection from the rocks near Dunkerron, County Kerry, Ireland. The type is in Taylor's Herbarium at the Boston Society of Natural History, Boston.

Thallus large, 15–20 cm. diameter; upper surface smooth, margins rarely sorediate, without cilia, rhizinae extending from the lower side, giving a superficial appearance of marginal cilia; lobes round and slightly dissected; lower surface brown at the margins, black with many black rhizinae at the center; apothecia rare, sessile, 2–6 mm. diameter, disks concave, chestnut-brown, margins of amphithecia smooth and regular; K, upper cortex yellow, medulla red-brown; C, none; K + C, none; P, none.

Algal layer continuous, 160–180  $\mu$  thick; upper cortex 36–40  $\mu$  thick, matrix light brown or yellowish; medulla of loosely interwoven hyphae of small diameter and of one type; lower cortex 48–60  $\mu$  thick, matrix black; thickness of thallus 304–350  $\mu$ ; thecium 80–90  $\mu$  thick, ascus clavate, spores 8, 6–8  $\times$  12–16  $\mu$ ; paraphyses branched, enlarged at the tips.

Distribution: Pennsylvania to North Carolina, west to Minnesota.

PENNSYLVANIA: LANCASTER CO.: *Small* (MBG); Russell Hill, July 1895, *Eby* (MBG).

NORTH CAROLINA: HENDERSON CO.: on the bark of trees, Flat Rock, Mar. 1, 1921, *Schallert* (MBG).

TENNESSEE: HAMILTON CO.: Lookout Mountain, *Calkins* (MBG).

MINNESOTA: YELLOW MEDICINE CO.: on shaded rocks, Granite Falls, July 17, 1899, *Fink 574* (MIN); on rocks, Redwood Falls, July 8, 1899, *Fink 360* (MIN).



**30. *Parmelia cetrata* Ach., Syn. Meth. Lich. 198. 1814.**

Acharius based his description on collections from North America, probably Muhlenberg's from Pennsylvania. The type is in Helsinki, Finland, and there is a co-type in Upsala, Sweden.

Thallus large, 10–20 cm. diameter, loosely adnate; upper surface wrinkled, but unbroken except at the margins where it is usually sorediate and somewhat ciliate, lobes short and wide or somewhat elongated and branched, usually ascending toward the margins; lower surface black with numerous black rhizinae, margins brown; apothecia rare, 4–15 mm. diameter, subpedicellate, disks deeply concave, chestnut-brown, commonly perforate at the center, amphithecia entire or fissured, regular or crenulate; K, none, C, none, K + C, none, P, none.

Algal layer continuous, 15–21  $\mu$  thick; upper cortex 12–15  $\mu$  with a yellow matrix; medulla of small, loosely interwoven, hyaline hyphae of one type; lower cortex 9–20  $\mu$  thick, matrix black or dark brown; thallus 165–180  $\mu$  thick; thecium 24–26  $\mu$  thick, ascus clavate or oval, 8-spored, spores 6–7  $\times$  7–9  $\mu$ .

Distribution: New Hampshire to Florida, west to Alaska and British Columbia.

NEW HAMPSHIRE: CARROLL CO.: on bark of very old *Fagus* in deep woods, Jaffrey, Aug. 1918, *Riddle* (F).

NEW YORK: COUNTY UNKNOWN: Port Jervis, *Buckley* (US).

MARYLAND: MONTGOMERY CO.: on cedar bark, Plummers Island, Aug. 18, 1907, *Fink* (M); dead limb, west side of Cabin Hill, Plummers Island in the Potomac River, near Cabin John, Nov. 6, 1938, *Leonard* (US).

DISTRICT OF COLUMBIA: on rotten log, wooded bank of Rock Creek, northern corner of D. C., Apr. 25, 1908, *Mary Miller* (US).

VIRGINIA: COUNTY UNKNOWN: July 17, 1891, *Seymour 1591* (F).

NORTH CAROLINA: HENDERSON CO.: on the bark of trees, Flat Rock on Warburg Road, June 1, 1922, *Schallert* (MBG,FM,WIS). MITCHELL CO.: on tree roots, Roan Mountain, June 15, 1936, *Schallert* (MBG).

GEORGIA: THOMAS CO.: Thomasville, Aug. 1906, *E. B. Taylor* (F). DE KALB CO.: on the summit of Stone Mountain, elev. 1686 ft., *Small* (M).

FLORIDA: ORANGE CO.: on trees, Sanford, Mar. 1922, *Rapp* (BPI); on trees, vicinity of Oviedo, May 1923, *Rapp* (BPI).

ALABAMA: LEE CO.: Auburn, Jan. 9, 1897, *Earle & Baker* (US).

MISSISSIPPI: HANCOCK CO.: on pine bark, Bay of St. Louis, Mar. 28, 1885, *Langlois* (W).

LOUISIANA: ST. MARTIN CO.: on trunk of tulip tree, near swamp, St. Martinsville, Sept. 22, 1896, *Langlois* (NYBG); Dec. 7, 1898, *Langlois* (US).



OHIO: CHAMPAIGN CO.: in cedar swamp, *Werner L426* (O). FRANKLIN CO.: on sycamore trunk, Slate Run, Columbus, Nov. 7, 1907, *H.S.B.* (O).

KENTUCKY: BELL CO.: woods, north side of Pine Mountain, 5.5 miles east of Pineville, Aug. 19, 1937, *Hubricht B337* (MBG). MADISON CO.: glade, 10 miles north of Richmond, Aug. 18, 1937, *Hubricht B200* (MBG). ROCKCASTLE CO.: open woods, 3.3 miles south of Berea, on Madison-Rockcastle county line, Aug. 18, 1937, *Hubricht B227* (MBG); bark of tree, open pine woods near Rockcastle River, east of Livingston, Aug. 18, 1937, *Hubricht B253* (MBG).

TENNESSEE: COUNTY UNKNOWN: on rocks, *Calkins* (FM).

WISCONSIN: LINCOLN CO.: on trees, Merrill Springs, May 30, 1893, *Head & Buell* (WIS).

ILLINOIS: JACKSON CO.: on sandstone boulders near Bat Cave, 5 miles southwest of Pomona, Apr. 14, 1940, *Hubricht B1736* (MBG). LA SALLE CO.: on bark of trees, *Calkins* (FM). COOK CO.: on trees, *Calkins* (FM).

MINNESOTA: KOOCHICHING CO.: on rocks, Gunflint, July 1, 1897, *Fink 362* (MIN). BELTRAMI CO.: on oak, Bemidji, July 12, 1900, *Fink 691* (MIN). REDWOOD CO.: on cedar, Redwood Falls, July 8, 1899, *Fink 329* (MIN). YELLOW MEDICINE CO.: on shaded rocks, Granite Falls, July 17, 1899, *Fink 573* (MIN).

IOWA: CLAYTON CO.: on trees, Sept. 1894, *Fink* (MIN); on trees, July 1897, *Freuring* (MBG). FAYETTE CO.: on trees, Apr. 1894, *Fink* (MBG). EMMETT CO.: on base of tree, bank of Mud Lake, Dec. 17, 1917, *Walden* (BPI).

MISSOURI: ST. FRANCOIS CO.: on bark of tree, open woods, Pickle Springs, May 21, 1938, *Berry* (MBG). LINCOLN CO.: July 1897, *Freuring* (MBG). GREENE CO.: rocky wooded bank of James River, 8 miles south of Springfield, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

ARKANSAS: GARLAND CO.: dry ridge, water works, Hot Springs, June 10, 1940, *Scully* (MBG). BAXTER CO.: dry upland woods, 1 mile west of Big Flat, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG). SEARCY CO.: open wooded hillside, 4 miles west of Marshall, Apr. 9, 1939, *Dodge, Berry & Johnson* (MBG). BOONE CO.: rocky wooded bluff, above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). NEWTON CO.: high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); moist woods on gentle slope near Marble Falls, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); steep, dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

OKLAHOMA: MURRAY CO.: Arbuckle Mountains, Nov. 29, 1914, *Emig* (US). MC CURTAIN CO.: on dead branches, grassy lake, 13 miles southeast of Broken Bow, *Stratton 78* (M).

TEXAS: BRAZOS CO.: on oak, 8 miles south of College Station, Apr. 21, 1936, *Hubricht* (MBG). GILLESPIE CO.: *Jermy* (MBG).

ALASKA: Juneau, Dec. 5, 1924, *Fink* (M).

BRITISH COLUMBIA: New Westminster, Jan. 1903, *Macoun* (F).

**30a. *Parmelia cetrata* var. *subisidiosa* Müll.-Arg., Engler's Bot. Jahrb. 15: 256. 1894.**

The type of the variety was from Cuba, and is in Geneva, Switzerland.



Margin of thallus beset with heavy black cilia; lower surface black with heavy black rhizinae; spore measurements, internal morphology of the thallus, and chemical reactions same as in the species.

Distribution: South Louisiana.

LOUISIANA: NEW ORLEANS CO.: on hardwoods near Indian Village, New Orleans, Dec. 31, 1931, *Dodge* (D).

**31. *Parmelia Hubrichtii* Berry, sp. nov.**

Type: Missouri Botanical Garden Herbarium, No. 154725.

Type locality: open woods, 1.4 miles north of Jarvis Store, Knox County, Kentucky.

Thallus 2–8 cm. diameter, loosely adnate to bark of trees; lobes small, round, dissected and somewhat imbricated, margins flat, light greenish-gray becoming darker at the center; upper cortex slightly wrinkled except at the margins, completely covered with small isidia; lower surface dark olivaceous-brown to black with a lighter margin, rhizinae black, numerous and long at the center of the thallus, at the margins smaller but not papillose; apothecium sessile, 1–5 mm. diameter, deeply concave, disk chestnut-brown, amphithecium covered with isidia or coralloid branchlets; K, upper cortex yellowish-green, medulla unchanged, C, none, K + C, none, P, none.

Algal layer continuous, 25–40  $\mu$  thick; upper cortex 12–16  $\mu$  thick, matrix yellow; medulla loosely interwoven, hyphae hyaline and of one type; lower cortex 25–30  $\mu$  thick, matrix black; thickness of thallus 120–150  $\mu$ ; thecium 52–56  $\mu$  thick; ascus ovate-clavate, spores 8, 8–9  $\times$  12–16 $\mu$ ; paraphyses branched, tips with oval enlargements; spermagonia spherical, immersed, upper half of walls brown, lower half hyaline, 128  $\mu$  diameter, spermatia slender and straight.

Thallus 2–8 cm. diametro, adnatus ad corticem; laciniae minimae rotundae, marginibus planis undulato-crenulatis et parvis isidiis tectis; superficies supra viridis, subtus nigra, rhizinis multis nigris; stratum superior 12–16  $\mu$  crassitudine; medulla laxe reticulata, hyphis hyalinis; stratum gonidiale continuum, 25–40  $\mu$  crassitudine; algae protococcideae; stratum inferior 25–30  $\mu$  crassitudine; thallus 120–150  $\mu$  crassitudine; stratum



superior KOH addito flavo-virescens, medulla non mutans, CaOCl<sub>2</sub> addito stratum superior et medulla non mutantes; KOH et CaOCl<sub>2</sub> addito non mutans; apothecium 1–5 mm. diametro, sessile, discus concavus rufo-brunneus, amphithecium ramulis coralloideis vel isidiis ramosis tectum; thecium 52–56  $\mu$  crassitudine; asci ovato-clavati, sporae 8-nae, 8–9  $\mu$  crassitudine, 12–16  $\mu$  longitudine, ellipsoideae; paraphyses ramosi, hyalini, apicibus globosis; spermagonia immersa, globosa, muris brunneis, 128  $\mu$  diametro, spermatia tenuia et recta.

Distribution: Kentucky to Alabama and west to Arkansas and Texas.

ALABAMA: MARSHALL CO.: open woods, 3.2 miles north of Boaz, July 21, 1939, *Hubricht B1545* (MBG).

MISSISSIPPI: MONROE CO.: 4 miles south of Nettleton, July 16, 1939, *Hubricht B1532* (MBG).

KENTUCKY: KNOX CO.: open woods, 1.4 miles north of Jarvis Store, Aug. 19, 1937, *Hubricht B305* (Type collection) (MBG). ROCKCASTLE CO.: on bark of trees, open pine woods, near Rockcastle River, east of Livingston, Aug. 18, 1937, *Hubricht B242* (MBG).

ARKANSAS: NEWTON CO.: dry wooded hillside, 9 miles south of Boxley, Boston Mountains, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG). CONWAY CO.: Petit Jean State Park, May 5, 1940, *Hubricht B1921* (MBG).

TEXAS: GILLESPIE CO.: *Jermy 429* (MBG). BEXAR CO.: mesquite woods, 18 miles east of San Antonio, May 17, 1940, *Hubricht B1926* (MBG).

### 32. *Parmelia erecta* Berry, sp. nov.

Type: Missouri Botanical Garden Herbarium, No. 154724.

Type locality: moist woods on gentle slope near Marble Falls, 11 miles south of Harrison, Newton County, Arkansas.

Thallus large, 10–20 cm. diameter, loosely adnate to bark of trees and bushes, habit of growth distinctly fruticose; upper surface smooth, margins crenulate, not sorediate, and beset with black cilia, but always thin and without a break between the upper and lower cortex; lobes wide, short and rounded, irregularly incised, light mineral-gray when dry, becoming grape-green when wet, younger portion covered with black ostioles of spermagonia; lower surface finely reticulate on raised portions, margins colored like the upper surface, when in contact with the substratum dark brown to black and thickly covered with short black rhizinae; apothecia numerous, 1–22 mm. diameter, subpedicellate and usually perforate when



mature, disk flat, light brown, margin of amphithecium irregularly crenulate and smooth; K, none, C, yellow, K + C, yellow, P, yellow.

Algal layer continuous, 21–22  $\mu$  thick; upper cortex 18–20  $\mu$  thick; lower cortex 27–30  $\mu$  thick at the center of the thallus and 15–23  $\mu$  thick at the margins, matrix black; thallus 515–530  $\mu$  thick; thecium 30–35  $\mu$  thick, ascus clavate, spores 8, 5–6  $\times$  8–9  $\mu$ ; paraphyses simply branched; spermagonia spherical, 185–192  $\mu$  diameter, wall light-colored or hyaline below, dark above, spermatia straight and pointed.

Thallus laxe adnatus, pallidus aridus, vito-viridis humidus, juventate habitu fruticosissimo, lobi marginibus rotundis, sublatis, rugosi, nigro-ciliati, partes juniores loborum ostioliis nigris spermagoniorum tectae; cortex superior 18–22  $\mu$  crassitudine, pseudoparenchymaticus, non sorediatus sed semper tenuis et sine ruptis inter illum et inferiorem corticem; cortex inferior minute reticulatus marginibus viridibus ut in cortice superiori, dilutior siccatus, rhizinis nigris tectus; medulla hyphis hyalinis dispersis; stratum gonidiale 21–22  $\mu$  crassitudine; cortex inferior cellulis pachydermaticis, nigrescens, 27–30  $\mu$  crassitudine; apothecia numerosa, sessilia, rotunda vel angulosa, 1–22 mm. diametro, marginibus non ciliatis, gonidiis sub excipulo et hymenio; thecium 30–35  $\mu$  crassitudine, asci clavati, octospori, sporae 5–6  $\mu$  crassitudine, 8–9  $\mu$  longitudine, hyalinae; spermagonia numerosa, immersa, globosa, 185–192  $\mu$ .

Distribution: North Carolina to Georgia, west to Texas.

NORTH CAROLINA: COUNTY UNKNOWN: on bark, Oct. 23, 1932, *Schallert* (MBG). YADKIN CO.: on tree branch, Lime Rock, May 12, 1936, *Schallert* (MBG).

ALABAMA: LEE CO.: on limbs, Auburn, Jan. 1, 1897, *Earle & Baker* (MIN).

LOUISIANA: ST. MARTIN CO.: on trees, St. Martinsville, 1893, *Langlois* (MIN).

MISSISSIPPI: MONROE CO.: 4 miles south of Nettleton, July 16, 1939, *Hubricht B1535* (MBG).

KENTUCKY: MADISON CO.: glade, 10 miles north of Richmond, Aug. 18, 1937, *Hubricht B1406* (MBG). KNOX CO.: open woods, 1.4 miles north of Jarvis Store, Aug. 19, 1937, *Hubricht B298* (MBG).

TENNESSEE: HAMILTON CO.: on bark, Chattanooga, *Calkins 284* (MIN).

ILLINOIS: COUNTY UNKNOWN: on trees, 1878, *Hall* (FM).

MISSOURI: ST. FRANCOIS CO.: bark of tree, Pickle Springs, May 21, 1938, *Berry* (MBG). IRON CO.: Royal Gorge, 3 miles east of Arcadia, Nov. 19, 1939, *Hubricht*



*B1726* (MBG). WAYNE CO.: old trees, Williamsville, Mar. 1898, *C. Russell* (MBG).

ARKANSAS: IZARD CO.: on bark of trees, rocky hillside, 10 miles north of Melbourne, Apr. 9, 1939, *Dodge, Berry & Johnson* (MBG). SEARCY CO.: on bark of trees, open wooded hillside, 4 miles west of Marshall, Apr. 9, 1939, *Dodge, Berry & Johnson* (MBG). BOONE CO.: on bark of tree, rocky wooded bluff above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). NEWTON CO.: on bark of tree, moist woods on gentle slope near Marble Falls, 11 miles south of Harrison, Ozark Mountains, Apr. 8, 1939, *Dodge, Berry & Johnson* (Type collection) (MBG); on branches of dead hackberry tree, high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Boston Mountains, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); on dead branch, steep dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); dry wooded hillside, 9 miles south of Boxley, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

TEXAS: WALLER CO.: on living *Xanthoxylum*, Hemstead, elev. 140 ft., Feb. 15, 1939, *Fisher 3928* (MBG). BEXAR CO.: mesquite woods, 1.5 miles southeast of junction of Jolly Lane and Atkins-Elmendorf Lane, 18 miles east of San Antonio, May 17, 1940, *Hubricht B1889* (MBG). BRAZORIA CO.: on oak fence post, Brazoria, elev. 50 ft., Feb. 8, 1939, *Fisher 3916* (MBG); on dead branches of *Quercus* sp., West Columbia, elev. 40 ft., Feb. 8, 1939, *Fisher 3914* (MBG). BRAZOS CO.: on dead branches of trees, 8 miles south of College Station, Apr. 21, 1936, *Hubricht* (MBG). GILLESPIE CO.: *Jermy* (MBG). REAL CO.: shade, Frio Canyon, 11 miles north of Leakey, May 23, 1938, *Hubricht B775* (MBG).

**33. *Parmelia livida* Tayl., Hook. London Jour. Bot. 4: 171. 1847.**

The type was collected near New Orleans, Louisiana, and is now in the Taylor Herbarium at the Boston Society of Natural History.

The distribution of this species is almost entirely tropical. It has been collected abundantly in Central America and northern South America.

Thallus small, adnate, upper surface smooth, shining, light gray to greenish-gray; lobes long, narrow, subdichotomously branched, margins smooth, closely adhering to the bark of trees; lower surface black with numerous black rhizinae which extend beyond the margin of the thallus; apothecia rare, small, 4–8 mm. diameter, disks flat, dark brown or blackish, amphithecia smooth, margins unbroken by fissures; K, none, C, medulla orange-brown, K + C, brown, P, orange.

Algal layer continuous, 12–15  $\mu$  thick; upper cortex 9–12  $\mu$  thick, matrix yellow or light brown; medulla loosely inter-



woven, hyphae hyaline and of one type; lower cortex 12–14  $\mu$  thick, matrix black; thallus 120–155  $\mu$  thick; thecium 45–60  $\mu$  thick; ascus cylindrical, spores 8 in a single row, 4–6  $\times$  9–12  $\mu$ ; paraphyses branched, very thin and pointed.

Distribution: Florida to Louisiana.

FLORIDA: ALACHUA CO.: red maple, near Gainesville, Mar. 14, 1938, *Murrill* (MBG). DUVAL CO.: Jacksonville, *Calkins* (MBG). ORANGE CO.: on trees, Sanford, Mar. 1918, *Rapp 641* (F).

LOUISIANA: ORLEANS CO.: New Orleans, *Taylor* (Type collection) (BSNH). ST. LUCIE CO.: Bois Levert, July 12, 1894, *Langlois* (US).

**34. *Parmelia Finkii*** Zahl. apud Hedr., *Mycologia* **26**: 162. 1934.

The type was collected by C. Russell at Williamsville, Wayne County, Missouri, and is No. 8943, Herbarium of University of Michigan.

Thallus small, 20–25 mm. diameter, closely adnate to bark of trees; upper surface granular with small soredia, isidia or coralloid branchlets; upper cortex cracked into areolate sections, small irregular breaks being left by the detachment of the isidia; lower surface black with many short black rhizinae; apothecium small, 0.4–3 mm. diameter, disk concave, chestnut-brown, margin of amphithecium dissected or formed by flat lobes which are covered with soredia and isidioid branchlets; K, none, C, medulla faint red; K + C, red; P, none.

Algal layer continuous, 16–24  $\mu$  thick; upper cortex 20–25  $\mu$  thick; medulla loosely interwoven, hyphae of small diameter and of one type; lower cortex 40–45  $\mu$  thick, matrix dark brown or black; thickness of thallus 140–200  $\mu$ ; thecium 40–45  $\mu$  thick; ascus clavate, spores 8, 5–6  $\times$  8–10  $\mu$ ; paraphyses branched, enlarged at the tips.

Distribution: Found only in Missouri.

MISSOURI: WAYNE CO.: on bark, Williamsville, Mar. 1898, *C. Russell* (Type collection) (M); on calcareous rocks, Williamsville, Mar. 3, 1898, *C. Russell 119* (MBG). JEFFERSON CO.: on *Juniperus virginianus*, Vineland, June 1898, *C. Russell* (MBG).

**35. *Parmelia caroliniana*** Nyl., *Flora* **68**: 614. 1885.

The type was from Aiken, South Carolina, and is *Ravenel 404* in Tuckerman's Herbarium.



Thallus light grayish-green, wrinkled, covered with coraloid branchlets, lobes narrow, with dissected wavy margins; lower surface dark brown to black, with scattered rhizinae; apothecium 2–4 mm. diameter, disk concave when young, flat when mature, light brown, amphithecium with isidia or branchlets; K, brown, C, yellow, K + C, brown, P, none.

Algal layer discontinuous, groups of algal cells 6–15  $\mu$  in diameter; upper cortex 22–24  $\mu$  thick; lower cortex 7–9  $\mu$  thick; medulla of loosely interwoven hyphae; thallus 127–154  $\mu$  thick; thecium 20–26  $\mu$  thick; ascus clavate, spores 8, 5–7  $\times$  8–9  $\mu$ ; paraphyses branched once or twice.

Distribution: South Carolina to Florida, west to Alabama.

SOUTH CAROLINA: AIKEN CO.: Aiken, 1854, *Ravenel 404* (Type collection) (T).  
COUNTY UNKNOWN: *Curtis* (NYBG).

FLORIDA: ORANGE CO.: on wild cherry, Sanford, *Rapp* (F); on oak, Sanford, Dec. 1923, *Rapp 410* (F).

ALABAMA: LEE CO.: Auburn, Jan. 9, 1897, *Earle & Baker 4* (NYBG).

TENNESSEE: COUNTY UNKNOWN: on trees, *Calkins* (FM).

**36. *Parmelia sublaevigata*** Nyl., Ann. Sci. Nat. Bot. V, 7: 306. 1867.

*Parmelia tiliacea* var. *sublaevigata* Nyl., Syn. Lich. 1: 383. 1860.

Nylander's type of the variety was from South Africa, and is now in his Herbarium in Helsinki, Finland.

Thallus variable in size, 4–20 cm. diameter, upper surface smooth, greenish-gray, without soredia or wrinkles; lobes alternately dissected, with a black fringe of the rhizinae extending from under the margin; lower surface with a dense covering of black rhizinae; apothecium 2–10 mm. diameter, sessile, disk flat or deeply concave, chestnut-brown; K, brown, C, none, K + C, none, P, none.

Algal layer continuous, 40–50  $\mu$  thick; upper cortex 28–30  $\mu$  thick, matrix light brown; medulla of loosely interwoven, hyaline hyphae of small diameter; lower cortex 32–36  $\mu$  thick, matrix black; thallus 120–140  $\mu$  thick; thecium 52–58  $\mu$  thick; ascus clavate, spores 8, 5–6  $\times$  6–8  $\mu$ ; paraphyses branched.

Distribution: North Carolina to Florida, west to California.



NORTH CAROLINA: MITCHELL CO.: on bark, Roan Mountain, June 15, 1936, *Schallert* (MBG); 1921, *Schallert* (F).

SOUTH CAROLINA: COUNTY UNKNOWN: *Ravenel* (MBG,BSNH).

FLORIDA: ORANGE CO.: on trees, Sanford, Apr. 1923, *Rapp* (BPI). DUVAL CO.: on *Taxodium*, near Jacksonville, *Calkins 5* (MBG,F); on *Andromeda*, Apr. 1923, *Rapp* (MBG); on trees, Jacksonville, *Calkins 2* (MIN).

ALABAMA: BALDWIN CO.: on trees, Fairhope, Oct. 17, 1924, *Evans* (F,NYBG); on tree, Fish River, Nov. 23, 1924, *Evans* (NYBG).

LOUISIANA: TANGIPAHOA CO.: on fence of old cypress pickets, Mar. 7, 1894, *Langlois* (NYBG); cypress swamp, 3 miles south of Ponchatoula, Mar. 26, 1937, *Johnson 215* (MBG).

KENTUCKY: KNOX CO.: open woods, 1.4 miles north of Jarvis Store, Aug. 19, 1937, *Hubricht B297* (MBG).

TENNESSEE: SEVIER CO.: woods, elev. 1600 ft., Great Smoky Mountains, 3 miles southwest of Gatlinburg, Aug. 25, 1937, *Hubricht B466* (MBG).

ILLINOIS: FULTON CO.: on oak, Canton, *Wolf* (NYBG).

MISSOURI: BOONE CO.: on bark of tree, Ashland, May 10, 1936, *Wilson* (B).

ARKANSAS: GARLAND CO.: on bark of pine tree, Hot Springs, Jan. 2, 1939, *Scully 1303* (MBG). CHICOT CO.: near Macon, Dec. 29, 1928, *E. Anderson* (MBG).

BOONE CO.: on rock, rocky wooded bluff, above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). NEWTON CO.: on bark, moist woods on gentle slope near Marble Falls, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); on bark, high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); bark of tree, dry wooded hillside, 9 miles south of Boxley, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

TEXAS: BRAZORIA CO.: on branch of oak, West Columbia, Feb. 1939, *Fisher* (MBG). GALVESTON CO.: Galveston, *Hall* (US).

CALIFORNIA: SAN DIEGO CO.: San Diego, *Orcutt 4782* (US).

### 37. *Parmelia cubensis* Nyl., Flora 68: 611. 1885.

The type is Charles Wright, *Lichenes Cubae*, 76, which was collected on the southeast coast of the Island of Cuba, and is now in Nylander's Herbarium, at Helsinki, Finland.

Thallus small, adnate, lobes narrow, imbricated from the center of the thallus, with small rounded lobules arising from the margins; upper surface smooth, greenish-yellow, well covered with the black ostioles of the spermagonia; lower surface light brown, thickly covered with short brownish or black rhizinae; apothecium sessile, 0.75–2 mm. diameter, margin of amphithecium smooth or occasionally dissected, disk concave, light brown; K, none, C, none, K + C, none, P, yellow.

Algal layer discontinuous, groups of algae 5–19  $\mu$  in diameter, upper cortex 22–25  $\mu$  thick; medulla of loosely interwoven hyphae of one type; lower cortex 7–9  $\mu$  thick; thallus 150–217  $\mu$



thick; thecium 41–44  $\mu$  thick; ascus clavate, spores 8, 5–6  $\times$  7–9  $\mu$ ; paraphyses branched, thin and pointed at the tip.

Distribution: Virginia to Florida, west to Texas.

VIRGINIA: JAMES CITY CO.: Williamsburg, Apr. 17, 1911, *Farlow* (F).

FLORIDA: ORANGE CO.: on trunk of palmetto, Sanford, *Rapp* (BPI).

ALABAMA: BALDWIN CO.: on tree, near Fish River, Mar. 22, 1925, *Evans* (NYBG); on live oak, Yupon Point, Mar. 1, 1925, *Evans 201* (F); on tree, Mar. 27, 1925, *Evans 371* (F).

LOUISIANA: PLAQUEMINES CO.: on live oak, Pointe a la Hache, July 4, 1885, *Langlois 101* (NYBG).

TEXAS: BREWSTER CO.: common on rocks, north side of Mount Emory, Feb. 18, 1934, *Warwick* (MBG).

**38. *Parmelia laevigata* (Sm.) Ach., Syn. Meth. Lich. 212. 1814.**

*Lichen laevigatus* Sm. apud Sowerb., Eng. Bot. **26: tab. 1852.** 1808.

*Parmelia sinuosa* var. *laevigata* Schaer., Enum. Crit. Lich. Eur., 43. 1850.

Smith's type was collected by Rev. Hugh Davies in Caernavonshire, Wales. The present location of the type is unknown. Smith presents in Sowerby's 'English Botany' a drawing which represents the description. In transferring the species to the genus *Parmelia*, Acharius evidently saw Smith's type, but there is no record of the type in Acharius' Herbarium. Schaerer cites 'Lichenes Helvetici Exsiccati,' 561, as the type of the variety.

Thallus 5–15 cm. diameter, thin, loosely attached to substratum; upper surface free from wrinkles or ridges, sometimes slightly soresiate; lobes narrow and somewhat imbricated, subdichotomously branched, rhizinae extending from beneath the margins, margins never ciliate; lower surface black to the margin, with numerous small black rhizinae; apothecium small, 3–6 mm. diameter, sessile, disk concave, chestnut-brown, amphithecium entire or serrate; K, medulla brown, upper cortex yellow; C, none, K + C, none, P, orange.

Algal layer continuous, 16–20  $\mu$  thick; upper cortex 20–25  $\mu$  thick, matrix brown; medulla loosely interwoven, of hyaline hyphae of small diameter; lower cortex 20–30  $\mu$  thick, matrix



black; thecium 52–55  $\mu$  thick; ascus clavate, spores 8, 5–7  $\times$  9–16  $\mu$ ; paraphyses branched.

Distribution: Nova Scotia to Vermont, west to Missouri.

NOVA SCOTIA: *Menzies* (US).

VERMONT: COUNTY UNKNOWN: on bark of tree, *Knowlton* (US).

MISSOURI: PULASKI CO.: on chert rocks, open woods, 2 miles north of Hanna, Oct. 8, 1938, *Hubricht B1708* (MBG).

TEXAS: BRAZORIA CO.: on dead branches of *Quercus* sp., elev. 40 ft., West Columbia, Feb. 8, 1939, *Fisher* (MBG).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Bohl. 110; Claud. 258; Cromb. 141; Harm. Lich. Loth. 289; Lerb. Caes. 64; Lerb. Herb. 124, 293; Malbr. 268, 370; Salw. 235; Spruce, 132, 176.

**39. *Parmelia endoxantha* Merrill, Bryol. 12. 73. 1909.**

The type is *Rapp XII*, in the Farlow Herbarium. The collection is from Sanford, Florida.

Thallus large, loosely adnate, surface smooth, dark shiny brown, becoming crustose and granular in the center; lobes radiating from the center, margins smooth and crinkled; lower surface olivaceous-brown, with many small light-colored rhizinae; cortex unbroken; apothecium sessile, 1–3 mm. diameter, disk slightly concave or flat, chestnut-brown, margin of amphithecium slightly incurved and dissected; K, medulla and upper cortex greenish-yellow; C, none, K + C, yellow, P, yellow.

Algal layer continuous, 8–14  $\mu$  thick; upper cortex 15–21  $\mu$  thick, hyphae of small diameter; medulla of very loosely interwoven large hyaline hyphae; lower cortex 15–18  $\mu$  thick; thecium 60–64  $\mu$  thick; ascus clavate to oval, spores 8, 6–7  $\times$  8–9  $\mu$ , almost globose; paraphyses branched and enlarged at the tips.

Distribution: found only in Florida.

FLORIDA: ORANGE CO.: on bark, Sanford, July 1907, *Rapp XII* (Type collection) (F); on trunk of *Magnolia glauca*, Sanford, Oct. 6, 1907, *Rapp 5* (F); on palmetto, Sanford, May 3, 1908, *Rapp 1* (F); on palmetto, Sanford, July 1917, *Rapp 16* (F). LEE CO.: on cypress trunk, vicinity of Fort Myers, Mar. 4, 1916, *Standley 13084* (US). DUVAL CO.: on cypress bark, Jacksonville, *Calkins* (FM, MIN).

**40. *Parmelia aurulenta* Tuck., Amer. Jour. Arts & Sci. II, 25: 424. 1858.**

The type was from Crawfords Gap, in the White Mountains of New Hampshire, and is now in Tuckerman's Herbarium at the Farlow.



Thallus varying from small to large, lobes short and round, margins dissected; upper surface wrinkled and covered with scattered or confluent, yellowish-green soredia; lower surface, brown to black with numerous small black rhizinae to the margin; apothecium 4–12 mm. diameter, sessile, disk concave, chestnut-brown, amphithecium often sorediate; K, medulla brown, C, none, K + C, brown, P, brown.

Algal layer continuous, 8–12  $\mu$  thick; upper cortex 9–12  $\mu$  thick; medulla of loosely interwoven, yellow hyphae; lower cortex 14–16  $\mu$  thick, matrix black; thallus 70–88  $\mu$  thick; thickness of thecium 20–25  $\mu$ ; ascus clavate, spores 8, 9–10  $\times$  12–17  $\mu$ ; paraphyses unbranched.

Distribution: Quebec to Florida, west to Minnesota.

QUEBEC: on spruce, Ste. Anne, May 5, 1935, *Lepage 133* (D).

ONTARIO: on trunks, Ottawa, May 10, 1907, *Macoun 200.07* (F).

MAINE: KNOX CO.: boulder in shaded places, Megunticook Lake, Camden, Aug. 13, 1913, *Merrill* (F).

NEW HAMPSHIRE: COOS CO.: White Mountains, near Crawford's Gap, 1844, *Tuckerman* (Type collection) (T).

VERMONT: RUTLAND CO.: on *Ostrya virginiana*, Haystack Mountain, Pawlet, Aug. 25, 1913, *Dodge 158* (D).

CONNECTICUT: TOLLAND CO.: Union, June 18, 1927, *Evans 1180* (F). MIDDLESEX CO.: on shaded rocks, East Hampton, May 14, 1927, *Evans 1053* (F). FAIRFIELD CO.: Oct. 26, 1926, *Evans 853* (F).

MARYLAND: BALTIMORE CO.: on rocks near Baltimore, 1909, *Plitt* (WIS, MBG, FM); on rock in woods along Gwynns Falls path, Sept. 19, 1905, *Merrill 101b* (F).

MONTGOMERY CO.: on hickory tree, west knoll, Plummers Island, near Cabin John, Nov. 6, 1939, *Leonard 2781* (MBG).

VIRGINIA: FAIRFAX CO.: Great Falls Park, July 25, 1931, *Plitt* (BPI); Harpers Ferry, 1889, *Lehnert* (US).

NORTH CAROLINA: HENDERSON CO.: on exposed rock, Flat Rock School House, June 1, 1922, *Schallert 6153* (WIS); on bark of tree, Flat Rock, May 5, 1922, *Schallert* (WIS). FORSYTH CO.: bark of tree, June 13, 1934, *Schallert* (MBG); Haines Town, June 6, 1922, *Chapman 917L* (F). CHATHAM CO.: Bennetts Rock, Apr. 10, 1936, *Schallert* (MBG). COUNTY UNKNOWN: on bark of tree, South Mountain, May 1, 1934, *Schallert* (MBG).

SOUTH CAROLINA: COUNTY UNKNOWN: on trees, *Calkins* (FM).

FLORIDA: ORANGE CO.: on *Myrica*, Sanford, *Rapp 317* (F).

ALABAMA: COUNTY UNKNOWN: 1852, *Peters* (T).

OHIO: COUNTY UNKNOWN: 1880, *Eckfeldt* (T).

ILLINOIS: COUNTY UNKNOWN: *Hall* (BSNH). MENARD CO.: bark of trees, Athens, 1878, *Hall* (FM); on old trees, 1878, *Hall* (FM).

MINNESOTA: CLAY CO.: on shaded rocks, near Ulen, July 5, 1899, *Fink 287* (MIN).

IOWA: EMMET CO: on rock, Esterville, Oct. 1926, *Fink* (BPI).



ARKANSAS: GARLAND CO.: on oak tree, Little Rock Highway, 3 miles from Hot Springs, July 23, 1939, *Scully 1375* (MBG). NEWTON CO.: on bark of tree, wooded hillside, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

**41. *Parmelia sulphurosa* (Tuck.) Fink, Lich. Fl. U. S., 328. 1935.**

*Parmelia tiliacea* var. *sulphurosa* Tuck., Syn. N. Amer. Lich. 1: 57. 1882.

The type of the variety cited by Tuckerman was collected by A. H. Curtiss in Florida. This plant is now in the Tuckerman Herbarium at the Farlow Herbarium. Fink used the same collection as a type in the transfer of the variety to the rank of species.

Thallus 3–10 cm. diameter, closely adnate to bark of trees, lobes short and rounded, slightly imbricated; upper surface smooth or covered with yellow soredia; medulla always yellow; lower surface black with brown margins, numerous black rhizinae; apothecium sessile, 1–9 mm. diameter, concave, light brown, amphithecium smooth or sorediate; K, none, C, none, K + C, none, P, none.

Algal layer continuous, 16–20  $\mu$  thick; upper cortex 8–12  $\mu$  thick, matrix yellow; medulla of loosely interwoven, hyaline hyphae of small diameter; lower cortex 8–16  $\mu$  thick, with a black matrix; thickness of thallus 100–120  $\mu$ ; thecium 40–48  $\mu$  thick; ascus clavate, spores 8, 3–4  $\times$  6–8  $\mu$ ; paraphyses branched and enlarged slightly at the tips.

Distribution: Florida to Louisiana.

FLORIDA: COUNTY UNKNOWN: 1878, *Curtiss* (Type collection) (T).

LOUISIANA: PLAQUEMINES CO.: Grand Bayou, July 17, 1885, *Langlois* (US).

#### IV. AMPHIGYMNIA

***Parmelia* subgenus *Euparmelia* sect. IV. *Amphigymnia*** Zahlbr. apud Engler & Prantl, Nat. Pflanzenfam. I Teil, Abt. 1: 213. 1907.

*Parmelia* sect. *Amphigymnia* Wainio, Étude Lich. Brésil 1: 28. 1860.

*Parmotrema* Mass., Atti I. R. Ist. Veneto, III. 5: 248. 1860.

Zahlbruckner's type is *Parmelia caperata* (L.) Ach. Wainio selected *Parmelia perlata* (Huds.) Ach. as the type of his sec-



tion of the subgenus *Euparmelia*. Massalongo cites *Parmelia perforata* (Wulf.) Ach. as the type of *Parmotrema*.

Thallus either smooth or ciliate at the margins; lower surface with a heavy mat of rhizinae at the center; marginal rhizinae either absent or papillose; apothecia sessile or very short-stalked. The distribution of the section is world-wide in the warmer portions of the earth.

KEY TO SPECIES IN *EUPARMELIA* SECTION *AMPHIGYMNIA*

- A. Margins always ciliate.
  - B. Upper surface never with lobules or isidia.
    - C. Closely adnate.
      - D. Lower surface light.....50a. *perforata* var. *hypotropa*
      - D. Lower surface dark.....50. *perforata*
    - C. Loosely adnate.....46. *perlata*
  - B. Always with lobules or isidia.
    - C. Lobules always present on upper surface and amphithecium..51. *proboscidea*
    - C. Isidia or coralloid branchlets always present.
      - D. Thallus loosely adnate, orbicular in outline.....48. *crinita*
      - D. Thallus closely adnate, never orbicular in outline.....
        - .....46a. *perlata* var. *ciliata*
- A. Margins never ciliate.
  - B. Upper surface smooth.
    - C. With marginal soredia.
      - D. Soredia white.
        - E. Soredia globose, confluent; K, reddish, C, none .....49. *cratifera*
        - E. Soredia not globose, scattered, never confluent.
          - F. Thallus light gray.
            - G. K, yellow-green, C, yellow.....47. *cetrarioides*
            - G. K, red-brown, C, none.....47a. *cetrarioides* var. *rubescens*
          - F. Thallus yellowish; K, none, C, red.....44. *soredica*
        - D. Soredia yellow; K, red, C, none.....45. *Herreana*
      - C. Without marginal soredia.
        - D. Thallus yellowish-green.
          - E. Smooth below; K, none, C, none.....43. *praesignis*
          - E. Reticulate below; K, red, C, intense red.....53. *latissima*
        - D. Thallus dark green; K, none, C, none.....42b. *caperata* var. *subglauca*
    - B. Upper surface with scattered soredia or isidia.
      - C. With scattered soredia.
        - D. K, yellow, C, none.....42. *caperata*
        - D. K, none, C, none.....42a. *caperata* var. *incorrupta*
      - C. With scattered isidia.....52. *tinctoria*

**42. *Parmelia caperata* (L.) Ach., Meth. Lich. 216. 1803.**

*Lichen caperatus* Linn., Sp. Pl. 1147. 1753.

*Platismia caperatum* Hoffm., Descr. & Adumbrat. Pl. Lich. 2: 50. 1794.



The type of Linnaeus was from central Europe, and the plant is now in the Linnean Herbarium in London. Hoffmann's type is unknown but he cites Linnaeus' *Lichen caperatus* as synonymous with his *Platisma caperatum*. Acharius' type is in Helsinki, Finland.

Thallus 5–25 cm. diameter, adnate on trees, stones, buildings, and fences; upper surface wrinkled and often sorediate, lobes short, rounded, imbricated margins crenate and often slightly ascending, seldom with soredia; lower surface black at the center with light brown margins, rhizinae black and heavy at the center, very small and light-colored at the margins; apothecium rare, sessile, 2–15 mm. diameter, disk chestnut-brown, concave, amphithecium entire, often with coralloid branchlets, isidia, or soredia; K, yellow, C, none, K + C, none, P, red.

Algal layer continuous or discontinuous, 15–30  $\mu$  thick; upper cortex 15–18  $\mu$  thick, matrix yellow-brown, cells small; medulla of loosely interwoven hyphae, of one type, hyaline and of small diameter; lower cortex 12–20  $\mu$  thick, matrix black or dark brown; thallus 114–120  $\mu$  thick; thecium 80–100  $\mu$  thick; ascus clavate, spores 8, 12–16  $\times$  16–20  $\mu$ ; paraphyses branched.

Distribution: Ontario to Florida, west to Washington and California.

ONTARIO: on old fence rails, Ottawa, Apr. 26, 1891, *Macoun 79* (MIN,WIS, MBG); on trees, stumps, and fallen trees, Rainy Lake, Aug. 20, 1930, *Schmidt 9* (MBG); on trunks and old rails, Ottawa, Apr. 26, 1900, *Macoun 50* (MBG); on trees in cedar swamps, Emo, July 17, 1901, *Fink 646* (MIN); on rocks, Emo, July 20, 1901, *Fink 769* (MIN).

MAINE: WASHINGTON CO.: June 1929, *Markin* (WIS). KENNEBEC CO.: Albion, Mar. 23, 1922, *Parlin 3* (D). CUMBERLAND CO.: on rocks, Cumberland, Nov. 7, 1855, *Blake* (FM); Peaks Island, Aug. 31, 1893, *Curtis* (NYBG). COUNTY UNKNOWN: 1859, *DeLeashi* (FM); 1863, *Blake* (FM).

NEW HAMPSHIRE: COOS CO.: on rocks, Cherry Mountain, Aug. 8, 1895, *Harper & Harper* (FM). COUNTY UNKNOWN: Wiley Brook, *Faxon* (MBG).

VERMONT: WINDHAM CO.: on apple tree, Pike Hollow, Wardsboro, July 3, 1935, *Moore 1358* (MBG); Grout Pond, Stratton, July 4, 1935, *Moore* (MBG). ADDISON CO.: Monkton, May 6, 1879, *Faxon* (WIS); on *Pinus Strobus*, Chipman Hill, Middlebury, Apr. 13, 1913, *Dodge* (D). RUTLAND CO.: cedar tree in swamp, Brandon, elev. 475 ft., Feb. 26, 1921, *Dutton 1215* (FM); on rocks, elev. 600 ft., Brandon, Nov. 11, 1922, *Dutton* (MBG); on rock, Tadmer Hill, Pawlet, Apr. 14, 1923, *Dodge* (D); Chipman Lake, Tinmouth, June 1938, *Dodge* (D).

MASSACHUSETTS: ESSEX CO.: on rocks, Annisquam, Apr. 1, 1892, *Cummings 55b* (WIS,MBG). MIDDLESEX CO.: Concord, 1863, *Mann* (FM). NORFOLK CO.:



Wellesley, *Cummings 108* (NYBG); on juniper, Wellesley, May 4, 1892, *Cummings 55* (MBG); on *Juniperus communis*, Wellesley, Nov. 1895 and 1896, *Cummings 170* (FM). BRISTOL CO.: New Bedford, *Willey* (BSNH); on rocks and trunks, New Bedford, *Willey 35* (FM); New Bedford, *Willey 40* (MIN). WORCESTER CO.: on chestnut tree, near Haynes Reservoir, Leominster, Feb. 6, 1922, *Fassett* (D). PLYMOUTH CO.: Hingham, *Russell* (FM). COUNTY UNKNOWN: *Russell* (WIS).

NEW YORK: YATES CO.: Dundee, *Wright 22* (FM). ONONDAGA CO.: on fence, Syracuse, Nov. 20, 1886, *Underhill* (NYBG).

PENNSYLVANIA: LANCASTER CO.: on chestnut rails, Aug. 27, 1879, *Rothrock* (FM); on trees, Lancaster, Mar. 4, 1894, *Eby* (MBG); on rocks, Mountville, Sept. 15, 1892, *Eby* (MBG); on bark, Beartown, June 1895, *Eby* (MBG); on fence rails, Rheinholds, Mar. 11, 1893, *Eby* (MBG); on rocks, Smithville, May 16, 1894, *Eby* (MBG); on trees, Crow Hill, Mar. 17, 1894, *Eby* (MBG). ADAMS CO.: on tree, Rock Creek, Gettysburg, May 29, 1936, *Mrs. E. C. White 215* (US). FRANKLIN CO.: Charmian, elev. 1320 ft., May 29, 1936, *Mrs. E. C. White 205* (US). COUNTY UNKNOWN: Brand Creek, 1855, *Dr. Mi* (FM).

MARYLAND: MONTGOMERY CO.: rock outcrop, west knoll, Plummers Island, in the Potomac River, near Cabin John, Nov. 6, 1938, *Leonard 2789, 2763* (US, MBG); base of hickory tree, west knoll, Plummers Island, in the Potomac River, near Cabin John, Nov. 6, 1938, *Leonard 2788* (US, MBG); rock outcrop, west end Plummers Island, in the Potomac River, near Cabin John, Nov. 7, 1937, *Leonard 2666* (US, MBG); vertical surface cliff, east side of Cabin Hill, Plummers Island, in the Potomac River, Nov. 6, 1938, *Leonard 2823* (US, MBG); rock outcrop, west knoll, Plummers Island, in the Potomac River, Nov. 6, 1938, *Leonard 2796* (US). COUNTY UNKNOWN: on rocks, Sept. 21, 1902, *Maxon* (M).

VIRGINIA: HIGHLAND CO.: on white oak, Monterey, Sept. 1, 1935, *Darrow 983* (FM). SMYTH CO.: on Walker Mountain, elev. 3300 ft., June 13, 1892, *Leeming* (W). WASHINGTON CO.: on summit of White Top Mountain, May 28, 1892, *Small* (MBG, MIN). COUNTY INDEFINITE: Blue Ridge, southwest Virginia, elev. 5670 ft., May 28, 1892, *Small* (MIN).

NORTH CAROLINA: STOKES CO.: on exposed rocks, Moore's Spring, May 3, 1930, *Schallert* (WIS). COUNTY UNKNOWN: on bark of trees, Nissen Park, July 4, 1922, *Schallert 1285* (WIS).

FLORIDA: LAKE CO.: Eustis, June 16-30, 1895, *Nash* (MBG). ORANGE CO.: Sanford, May 1911, *Rapp* (BPI).

LOUISIANA: COUNTY UNKNOWN: on pickets, Jan. 3, 1894, *Langlois* (M).

OHIO: BELMONT CO.: on tree trunks, Apr. 30, 1938, *Wareham 933* (O). GEAUGA CO.: on trees, Oct. 9, 1937, *Wolfe 911* (O). MEIGS CO.: on rock, Apr. 5, 1936, *Wolfe 516* (O). ATHENS CO.: on rock in woods, Sept. 22, 1935, *Wolfe 258* (O). RICHLAND CO.: on bark of tree, Apr. 20, 1935, *Wareham 84* (O). HOCKING CO.: on tulip tree, Ash Cave, Oct. 13, 1935, *Wolfe 278* (O). JACKSON CO.: on north facing of cliff, Nov. 3, 1935, *Wolfe 322* (O). FAIRFIELD CO.: on face of cliff, Apr. 27, 1935, *Wolfe 99* (O). SCIOTO CO.: on oak, Mar. 22, 1936, *Wolfe 500* (O). DELAWARE CO.: on exposed root of white oak, Apr. 20, 1935, *Wolfe 6* (O). PICKAWAY CO.: on elm, May 5, 1935, *Wolfe 133* (O). PIKE CO.: on bark, Sept. 15, 1935, *Wolfe 207* (O). WYANDOTTE CO.: on white oak, May 29, 1935, *Wolfe 229* (O). UNION CO.: on trees near road, May 3, 1936, *Wolfe & Hartley 656* (O). ADAMS CO.: on cedar, Lynn, May 28, 1937, *Wolfe 850* (O). LOGAN CO.: on elm, May 3, 1931, *Wolfe & Hartley*



660 (O). CLINTON CO.: on oak, Mar. 18, 1936, *Wolfe & Hill 588* (O). BROWN CO.: on elm, Apr. 18, 1936, *Wolfe & Hill 583* (O). CHAMPAIGN CO.: willow tree along Storms Creek, home farm 1¼ miles east of Thackery, July 9, 1934, *Leonard 1722* (US,MBG). CLERMONT CO.: on tree, Apr. 18, 1936, *Wolfe & Hill 612* (O). WARREN CO.: on tree, Apr. 18, 1936, *Wolfe & Hill 602* (O). DARKE CO.: on trees, New Madison, Apr. 2, 1938, *Wallace 922* (O). PREBLE CO.: on granite, open woods, Eaton, Mar. 9, 1914, *Fink* (M). BUTLER CO.: on stone, Oxford, July 6, 1924, *Walters* (M).

MICHIGAN: KEWEENAW CO.: Isle Royale, Sept. 13, 1901, *Stuntz & Allen* (WIS). ALGER CO.: on cedar in swamp, Grand Marais, Aug. 2, 1902, *Fink* (M). MARQUETTE CO.: on trees, Mud Lake Bog, Whitman Lake, June 17, 1930, *Hedrick* (M).

INDIANA: TIPPECANOE CO.: on rocks in open wood near Lafayette, Aug. 31, 1917, *Fink & Tuson* (D). FOUNTAIN CO.: on sandstone rock in the Bear Creek Canyon just south of Fountain, Apr. 22, 1917, *Deam 22.252* (BPI).

KENTUCKY: ROCKCASTLE CO.: bark of trees, open pine woods near Rockcastle River east of Livingston, Aug. 18, 1937, *Hubricht B253* (MBG). BALLARD CO.: Kevil, Apr. 26, 1936, *Fassett* (WIS).

TENNESSEE: HAMILTON CO.: on rocks, Lookout Mountain, *Calkins 7* (MIN).

WISCONSIN: FOND DU LAC CO.: on granitic rocks in pasture at north end of Wolf Lake, July 17, 1938, *Schinnors* (WIS); bark of trees, edge of tamarack bog, northeast end of Wolf Lake, July 17, 1938, *Schinnors* (WIS). DODGE CO.: on rocks, northeast of Kekoskee, May 1936, *J. Thomson* (WIS). WAUSHARA CO.: 2 miles east of Plainfield, Oct. 13, 1935, *J. Thomson* (WIS); sand plains, abandoned 7 years, south of Plainfield, Oct. 13, 1935, *J. Thomson* (WIS). MARQUETTE CO.: in *Larix* swamp, 12 miles east of Westfield, Oct. 13, 1935, *J. Thomson* (WIS). DANE CO.: common on trees and fences, Madison, May 10, 1893, *Head & Buell* (WIS). VILAS CO.: valley of Wisconsin River near Lac Vieux Desert, Summer, 1893, *Cheney* (WIS). SAUK CO.: on bark, Devils Lake, Oct. 27, 1935, *J. Thomson* (WIS). JUNEAU CO.: Apr. 1936, *J. Thomson* (WIS). MONROE CO.: 9 miles west of Tomah, Nov. 14, 1935, *J. Thomson* (WIS). GRANT CO.: bluffs of Wisconsin River, Potosi, Oct. 6, 1935; *J. Thomson* (WIS). LA CROSSE CO.: on trees, La Crosse, Dec. 1894, *Pammel* (MBG). WASHBURN CO.: on bark of dead, white birch tree, also on moss of forest floor near Spooner, Apr. 1932, *Flint* (MONT).

ILLINOIS: COOK CO.: on oaks, *Calkins* (FM). JACKSON CO.: on sandstone boulders near Bat Cave, 5 miles southwest of Pomona, Apr. 14, 1940, *Hubricht B1734* (MBG). MENARD CO.: on old trees, 1878, *Hall* (FM); *Hall 8* (FM); on rock, Athens, May 16, 1879, *Hall* (FM). ADAMS CO.: on boulders, Quincy, May 30, 1898, *Harper & Harper 34* (FM).

MINNESOTA: COOK CO.: on rocks, Grand Portage Island, June 23, 1897, *Fink 916* (MIN); on cedar in swamp, Grand Marais, Aug. 2, 1902, *Fink 5284* (MIN). LAKE CO.: Two Harbors, Aug. 25, 1893, *Harper* (FM); on trees, Beaver Bay, July 14, 1897, *Fink 728* (MIN); on trees, Snowbank Lake, July 19, 1897, *Fink 804* (MIN); on trees, Snowbank Lake area, July 24, 1897, *Fink 916* (MIN). ST. LOUIS CO.: on trunk of *Fraxinus americana*, Vermilion Lake, July 19, 1886, *Arthur, Bailey Jr. & Holway A25* (MIN); on rocks, Tower, Aug. 24, 1901, *Fink 1718* (MIN). CARLTON CO.: on trees, Taft, Carlton Peak, July 10, 1897, *Fink* (MIN). KOOCHICHING CO.: on earth, Gunflint, June 30, 1897, *Fink 254A* (MIN); on rocks, Koochiching, July 31, 1901, *Fink 1059* (MIN). AITKIN CO.: on rocks, Palisades, July 15, 1897, *Fink 768* (MIN); on *Pinus Strobus*, Mille Lacs Indian Reservation, June 1892, *Sheldon S2636* (MIN). HENNEPIN CO.: on bark, Minne-



apolis, Apr. 1891, *Sheldon S4108* (MIN). BLUE EARTH CO.: on trees and rocks, Mankato, July 23, 1899, *Fink 53* (MIN); on trees, Mankato, June 27, 1899, *Fink 153* (MIN). LAKE OF THE WOODS CO.: on bark, Lake of the Woods, July 1896, *Millan 4* (MIN). BELTRAMI CO.: on trees, Red Lake, July 26, 1900, *Fink 898* (MIN); on tamarack in swamp, Bemidji, July 7, 1900, *Fink 527* (MIN); on pines, Bemidji, July 11, 1900, *Fink 659* (MIN); on rocks along lake, Red Lake, Aug. 1, 1900, *Fink 1033* (MIN); on old trees, Beaudette, June 19, 1901, *Fink 20* (MIN). MEEKER CO.: on bark of trees, Litchfield, June 1892, *Frost F115d* (MIN). OTTERTAIL CO.: on trees, Battle Lake, June 19, 1900, *Fink 26* (MIN); on tamarack in swamp, Henning, June 25, 1900, *Fink 195* (MIN); on tamarack in swamp, Henning, July 2, 1900, *Fink 409* (MIN). ROSEAU CO.: on trees, Warroad, June 26, 1901, *Fink 182* (MIN). BECKER CO.: on trees, Oak Island, July 11, 1901, *Fink 524* (MIN). PENNINGTON CO.: on trees, Thief River Falls, July 20, 1900, *Fink 832* (MIN); on trees, Thief River Falls, July 20, 1900, *Fink 841* (MIN). POLK CO.: Red River, May 1857, *Fink* (MIN). CLAY CO.: on rocks near Ulen, July 5, 1899, *Fink 285* (MIN). PIPESTONE CO.: on rocks, Pipestone, 1892, *Manzel* (MIN). COUNTY INDEFINITE: on trees, Misquah Hills, July 3, 1897, *Fink 403* (MIN); on twigs, Shoal Lake Island, July 1894, *Millan & Sheldon 1040* (MIN).

IOWA: MUSCATINE CO.: on rocks, Wild Oat Glen, Nov. 15, 1897, *Savage & Shink* (IA). HENRY CO.: on bark, Jan. 1, 1898, *Savage* (IA). JOHNSON CO.: on apple tree, Mar. 20, 1896, *Fitzpatrick & Fitzpatrick* (FM). FAYETTE CO.: on trees and fences, 1892, *Fink* (MIN, MBG). POWESHIEK CO.: on sandstone, Grinnell, Mar. 13, 1904, *Fink 246* (FM).

MISSOURI: DUNKLIN CO.: on tree, Sept. 28, 1897, *Bertig* (MBG). STE. GENEVIEVE CO.: on soil over rocks, River Aux Vases, Apr. 10, 1932, *Moore* (MBG). WAYNE CO.: on tree, Clark Mountain, Mar. 1898, *C. Russell* (MBG). ST. LOUIS CO.: on trees, Valley Park, May 1897, *C. Russell* (MBG); on bark of tree, Ranken Estate, Valley Park, Apr. 20, 1939, *Berry* (MBG); on trees, Allenton, Apr. 15, 1905, *Schulte & Jones* (MBG). ST. FRANCOIS CO.: on rocks, open woods, Koester, June 10, 1939, *Hubricht B1508* (MBG); bark of tree, Pickle Springs, May 21, 1938, *Berry* (MBG); on sandstone ledges in woods, Pickle Springs, May 21, 1938, *Berry* (MBG). WASHINGTON CO.: rock-covered hillside, near Antonio, Oct. 29, 1939, *Berry* (MBG). IRON CO.: full sun to semi-shade, Royal Gorge, 3 miles east of Arcadia, Nov. 18, 1939, *Hubricht B1722* (MBG); near Arcadia, May 1925, *Greenman* (MBG). LINCOLN CO.: July 1897, *Freuring* (MBG). FRANKLIN CO.: sandstone ledge in sunny glade, Missouri Botanical Garden Arboretum, Gray Summit, May 2, 1938, *Berry* (MBG). MONTGOMERY CO.: bark of tree, Montgomery City, Nov. 23, 1930, *Drouet* (MBG). BOONE CO.: on decayed stumps, wooded hillside, 9 miles east of Columbia, Oct. 5, 1935, *Berry 240* (MBG). PULASKI CO.: on chert, open woods 2 miles north of Hanna, Oct. 8, 1939, *Hubricht B1709* (MBG). GREENE CO.: on bark of tree, rocky wooded bank of James River, 8 miles south of Springfield, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

ARKANSAS: BOONE CO.: on twigs and bark, rocky wooded bluff above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG). NEWTON CO.: on bark of tree, high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); bark of tree, steep dry wooded bluff with rocky flat at top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); wooded hillside, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).



GARLAND CO.: on rocks on ridge, water-works, Hot Springs, July 19, 1939, *Scully 1370* (MBG). WHITE CO.: on bark of tree, near Judsonia, Dec. 28, 1938, *E. Anderson* (MBG). LOGAN CO.: open woods, 0.6 mile east of the Lodge, summit of Magazine Mountain, May 4, 1940, *Hubricht B1905* (MBG).

SOUTH DAKOTA: PENNINGTON CO.: on bark of trees, Rapid City, Apr. 27, 1927, *Lee* (F).

OKLAHOMA: MURRAY CO.: on dead cedar, Prices Falls, Apr. 30, 1926, *Stratton* (M).

TEXAS: DENTON CO.: on oaks, 3 miles southwest of Denton, Feb. 1935, *Bussard* (MBG). BREWSTER CO.: practically covering the trunks of pines on the north side of Mount Emory, Chisos Mountains, July 2, 1937, *Warnock* (MBG).

COLORADO: EL PASO CO.: on log of *Pseudotsuga taxifolia*, elev. 8300 ft., Pikes Peak, July 1919, *I. M. Johnston* (F). LA PLATTE CO.: on dead wood, 14 miles south of Durango, elev. 6700 ft., Aug. 16, 1920, *Reeside Jr.* (BPI). WELD CO.: over siliceous rocks, South St. Vrain Canyon, elev. 7200 ft., Oct. 7, 1936, *Kiener 4526* (MBG).

NEW MEXICO: COLFAX CO.: on moist igneous rocks, vicinity of Ute Park, elev. 2200-2900 m., Aug. 23, 1916, *Standley* (F). SAN MIGUEL CO.: on trees, Las Vegas, 1926, *Bro. Anect* (M). TORRANCE CO.: Manzano Mountains, July 28, 1932, *Jones* (M).

ARIZONA: COCHISE CO.: Carr Peak, Huachuca Mountains, July 16, 1909, *Gooding* (F).

WASHINGTON: WALLA WALLA CO.: on bluffs of columnar lava, along the Columbia River, gorge below Wallula, elev. 200 ft., *Foster* (F).

OREGON: COUNTY INDEFINITE: in forest, Nov. 10, 1894, *Lloyd* (NYBG).

CALIFORNIA: SAN FRANCISCO CO.: on rocks and twigs, San Francisco, near Golden Gate, elev. 50 ft., July 1904, *Herre* (LSU,MIN,MBG). SANTA CLARA CO.: on trees, Black Mountain, Santa Cruz Mountains, June 16, 1903, *Herre* (M,LSU,MBG). SANTA CRUZ CO.: Santa Cruz, *C. S. Anderson* (BSNH). MONTEREY CO.: on shaded granite, cypress headland, Point Lobos Reserve, July 11, 1936, *Wheeler* (MBG). LOS ANGELES CO.: large oak, Bull Rush Canyon, Santa Catalina Island, *Knopf* (F). SAN DIEGO CO.: shade to semi-shade, forming thick mats on trunks of oak, pine and cypress, Alpine, Jan. 1933, *Cota* (MBG).

**42a. *Parmelia caperata* var. *incorrupta* (Moore) Berry, n. comb.**

*Parmelia incorrupta* Moore, Ann. Mo. Bot. Gard. **19**: 503. 1932.

Moore's type was collected in the Guadalupe Mountains of Texas, and is now in the Missouri Botanical Garden Herbarium, No. 1020340.

This plant differs from the species only in that it gives no color reaction with KOH, and this, in the opinion of the writer, does not constitute a specific difference.

Distribution: found only in Texas.



TEXAS: CULBERSON CO.: on bark of *Pinus flexilis*, ridge above McKittrick Canyon, elev. 2300 m., Guadalupe Mountains, July 17, 1931, *Moore & Steyermark 3490* (Type collection) (MBG); on *Quercus*, slopes of Emory Peak, elev. 2000 m., June 22, 1931, *Moore & Steyermark 3220* (MBG). EL PASO CO.: Fort Bliss, *Mrs. Jos. Clemens* (MBG).

**42b. *Parmelia caperata* var. *subglauca*** (Gasilien) Nyl., Lich. Envir. Paris, 35. 1896.

*Parmelia subglauca* Gasilien, Jour. de Bot. (Morot) 8: 126. 1894.

The type of Gasilien was from Saint Omer, France. The type is unknown, but a co-type collection is in Nylander's Herbarium at Helsinki, Finland. Nylander did not change the type in his transfer of the species to a variety.

This plant differs from the species in its small size, glossy upper surface, the abundance of the apothecia, and in the absence of any reaction with KOH.

Distribution: found only in Texas.

TEXAS: NUECES CO.: on trees, vicinity of Corpus Christi, Mar. 1894, *Heller 197, 260* (MIN, MBG, WIS, FM). GILLESPIE CO.: Big Branch, *Jermy* (MBG). BEXAR CO.: San Antonio, *Langlois* (US); mesquite woods, 18 miles east of San Antonio, May 17, 1940, *Hubricht 1927* (MBG); mesquite woods, 1.5 miles southeast of junction of Jolly Lane and Atkins-Elmendorf Lane, 18 miles east of San Antonio, May 17, 1940, *Hubricht B1891* (MBG). HARRIS CO.: Houston, *Hall* (FM).

**43. *Parmelia praesignis*** Nyl., Bull. Soc. Linn. Norm. II, 6: 270. 1872.

The type was collected in the Valley of Mexico, and is Bourgeau, No. 1361, in the Paris Museum.

Thallus large, 10–20 cm. diameter, loosely adnate to bark of trees; upper surface slightly wrinkled, cortex often broken by irregular cracks or round holes; lobes wide, short, round, and slightly dissected, margins flat, smooth and slightly brownish in color; lower surface brown at the margins, black at the center, with a few black rhizinae at the points of contact with the substratum; apothecium 1–5 mm. diameter, sessile, disk deeply concave, margins of amphithecium thick, cortex often missing in irregular areas; K, upper cortex yellowish-brown, which soon disappears, medulla none, C, none, K + C, none, P, medulla gray.



Algal layer continuous, 12–15  $\mu$  thick; upper cortex 16–20  $\mu$  thick, matrix light brown; medulla of loosely interwoven, large, hyaline hyphae; lower cortex 35–40  $\mu$  thick, matrix black; thallus 243–260  $\mu$  thick; thecium 100–125  $\mu$  thick; ascus clavate, spores 8, 6–8  $\times$  14–16  $\mu$ ; paraphyses branched.

Distribution: Arizona and New Mexico.

NEW MEXICO: CATRON CO.: shade, 11 miles north of Pie Town, June 9, 1938, *Hubricht B1062* (MBG).

ARIZONA: PIMA CO.: on trees, near Tucson, *Fink 12974* (M).

This plant is widely distributed in Mexico and Central America.

**44. *Parmelia soledica* Nyl., Flora 68: 605. 1885.**

The type was collected in Saskatchewan, Canada, and is in Nylander's Herbarium, Helsinki, Finland. The collector is unknown.

Thallus large, adnate to substratum, yellowish-green to yellowish-brown, margins and upper surface with many white soredia which often become large and are easily detached; lobes wide, round, and sparingly branched, margins slightly ascending, wrinkled and somewhat inflated; lower surface brown at the margin, black at the center with very few scattered rhizinae; apothecium rare, 3–12 mm. diameter, sessile, disk concave, chestnut-brown, amphithecium sorediate; K, none, C, medulla red, K + C, none, P, none.

Algal layer continuous, 20–30  $\mu$  thick; upper cortex 20–24  $\mu$  thick, matrix yellow, cells of cortex very small; medulla of loosely interwoven, hyaline hyphae of one type; lower cortex 20–30  $\mu$  thick, matrix black; thallus 320–342  $\mu$  thick; thecium 38–40  $\mu$  thick, ascus clavate, spores 8, 6–8  $\times$  12–16  $\mu$ ; paraphyses branched and slightly enlarged at the tip.

Distribution: British Columbia to New Mexico and California.

NEW MEXICO: SOCORRO CO.: shade, 4 miles west of Magdalene, June 9, 1938, *Hubricht B1046* (MBG); shade, San Andres Mountains, Rhodes Pass, 47 miles west of Tularosa, June 6, 1938, *Hubricht B992* (MBG).

BRITISH COLUMBIA: on rocks, 2000 ft. elev., *Macoun* (FM).

CALIFORNIA: CONTRA COSTA CO.: on *Pinus ponderosa*, Mount Diablo, May 18, 1932, *Herre* (LSU); on *Quercus* sp., Mount Diablo, May 19, 1932, *Herre* (LSU).



ALAMEDA CO.: Oakland Hills, elev. 1000 ft., Mar. 14, 1935, *Herre* (LSU). SANTA CLARA CO.: on *Quercus lobata*, Stanford University, elev. 75 ft., Feb. 4, 1903, *Herre* (MBG,MIN); on roof of house, Mayfield, elev. 35 ft., Santa Cruz Peninsula, Apr. 1, 1904, *Herre* (MBG,MIN); on *Quercus lobata*, Los Gatos, Mar. 1, 1905, *Herre* (LSU); on twigs, Searsville Ridge near Stanford University, Mar. 3, 1936, *Herre* (LSU); on bark of *Catalpa*, campus of Stanford University, Nov. 14, 1939, *Herre* (LSU). SAN BENITO CO.: red oak, near Aromas, July 23, 1939, *Herre* (LSU); on trees, Searsville, elev. 318 ft., July 4, 1903, *Herre* (MBG,MIN); bark of *Ficus*, Goff ranch, Kenwood, Jan. 27, 1936, *Goff 26* (LSU). LOS ANGELES CO.: Santa Monica Range, Feb. 1895, *Hasse* (FM). SONOMA CO.: 1893, *Bioletto* (LSU). MARIN CO.: bark of tree, Mill Valley, Nov. 20, 1930, *Herre* (LSU). SAN MATEO CO.: Kings Mountain, Santa Cruz Mountains, elev. 1900 ft., Spring 1930, *Herre* (LSU); on live oak, elev. 2000 ft., Santa Cruz Mountains, Aug. 12, 1938, *Herre* (LSU); on *Quercus agrifolia*, hills near Woodside, elev. 800 ft., Nov. 18, 1939, *Herre* (LSU); on oaks, Santa Cruz Mountains, 12 miles west of Stanford University, elev. 1500 ft., Apr. 26, 1933, *Herre* (LSU).

**45. *Parmelia Herreana*** Zahl., Cat. Lich. Univ. 6: 239. 1930.  
*Parmelia perlata* var. *flavicans* Tuck., Lich. Calif., 13. 1866.  
*Parmelia flavicans* Tuck., Syn. N. Amer. Lich. 1: 55. 1882  
(non Ach.).

Tuckerman's type was from Oakland, California, and is now in his herbarium in the Farlow. The specific name *flavicans* is non-valid because of its prior use by Acharius. Zahlbruckner applied a valid name to the type.

Thallus large, 8–15 cm. diameter, loosely adnate to bark of trees and stones; upper surface smooth, greenish-yellow or pale yellowish, with yellow soredia, lobes wide or narrow with crenate and sorediate margins; lower surface black with a chestnut-brown margin, scattered black rhizinae at the points where the thallus touches the substratum; apothecium 3–6 mm. diameter, disk chestnut-brown, slightly concave, amphithecium often sorediate; K, red, C, none, K + C, red, P, none.

Algal layer continuous, 22–24  $\mu$  thick, or of thinly scattered gonidia 20–22  $\mu$  in diameter; upper cortex 40–60  $\mu$  thick; medulla of loosely interwoven hyphae of one type; lower cortex 20–30  $\mu$  thick, matrix brown or black; thallus 120–130  $\mu$  thick; thecium 88–108  $\mu$  thick; ascus clavate, spores 8, 6–8  $\times$  16–20  $\mu$ ; paraphyses branched and enlarged at the tips.

Distribution: Idaho to Arizona, west to California.

IDAHO: NEZ PERCES CO.: Lake Waha, elev. 2000–3500 ft., June 29, 1896, *Heller & Heller* (MBG).



ARIZONA: YAVAPAI CO.: Prescott, July 1898, *Kanza* (NYBG).

CALIFORNIA: ALAMEDA CO.: on bark of trees and among mosses, deep canyon, Oakland, *Bolander 70* (Type collection) (T). SANTA CLARA CO.: sandstone, elev. 200–300 ft., Pilarcitos Creek Canyon, Aug. 14, 1903, *Herre 212* (NYBG); on mossy sandstone, foothills near Stanford University, elev. 300 ft., Aug. 9, 1936, *Herre* (LSU); sandstone covered with moss, hills near Stanford University, elev. 400 ft., Mar. 22, 1903, *Herre* (MBG). SAN BENITO CO.: on sandstone, big rock on Pinedale cutoff, Mar. 31, 1935, *Herre* (LSU). LOS ANGELES CO.: on mossy bank, elev. 2200 ft., mountains north of Claremont, Oct. 22, 1816, *I. M. Johnston 3039* (LSU). SONOMA CO.: on sandstone, stony point near Searsville, July 9, 1903, *Herre* (NYBG, MIN, MBG). RIVERSIDE CO.: on wet moss, barranca switch back, of highway, San Jacinto Mountains, elev. 4000 ft., Feb. 23, 1935, *Reed* (MBG). SAN DIEGO CO.: San Diego, 1933, *Cota* (MBG).

**46. *Parmelia perlata* (Huds.) Ach., Meth. Lich. 216. 1803.**

*Lichen perlatus* Huds., Fl. Anglica, 448. 1762.

*Lobaria perlata* Hoffm., Deutschl. Fl. 2: 148. 1795.

Hudson's type was collected in England, its present location being unknown. Acharius cites Hudson's plant as synonymous with his, and also cites as a synonym, Wulfen apud Jacquin, 'Collectanea' 4: t. 10. 1790.

Thallus 5–20 cm. diameter, loosely adnate; upper surface smooth except at the margins where it is commonly sorediate, margins wavy and somewhat dissected dichotomously at the tips of the lobes, slightly ciliate; lower surface black with scattered black rhizinae which often give the appearance of black cilia, margins brown; apothecium rare, sessile or very short-pedicellate, 4–12 mm. diameter, disk chestnut-brown, concave, amphithecium entire and never sorediate; K, yellow then red, C, none, K + C, none, P, none.

Algal layer continuous, 15–20  $\mu$  thick; upper cortex 12–16  $\mu$  thick, yellow-brown; medulla loosely interwoven, hyphae of one type, hyaline and of small diameter; lower cortex 20–24  $\mu$  thick, matrix dark brown or black; thickness of thallus 132–140  $\mu$ ; thecium 88–94  $\mu$  thick; ascus clavate, spores 8, 8–10  $\times$  10–12  $\mu$ ; paraphyses branched and enlarged at the tip.

Distribution: Quebec to Florida, west to British Columbia and California.

QUEBEC: on twigs, woods along River Ste. Anne des Monts, July 22, 1923, *Collins & Dodge* (F).

MAINE: WALDO CO.: on boulder, Freedom, Sept. 24, 1922, *Parlin* (F).



NEW HAMPSHIRE: COOS CO.: White Mountains, 1885, *Farlow 415* (F). GRAFTON CO.: on rocks, North Woodstock, Franconia Mountains, July 1891, *Cummings* (F).

VERMONT: WINDSOR CO.: exposed ledges, Rochester, *Dutton* (F). RUTLAND CO.: on *Acer*, Pawlet, Aug. 1913, *Dodge* (D).

MASSACHUSETTS: WORCESTER CO.: on rocks, Lunenburg, 1883, *Sargent 416* (F).

PENNSYLVANIA: LANCASTER CO.: Welsh Mountain, Feb. 27, 1892, *Small* (MIN).

VIRGINIA: SMYTH CO.: along Necks Creek, June 4, 1892, *Leeming* (NYBG).

NORTH CAROLINA: HENDERSON CO.: on bark of tree, Flat Rock, *Schallert 1939* (WIS). FORSYTH CO.: on bark of tree, Bennetts Rock, Apr. 10, 1936, *Schallert* (MBG). HAYWOOD CO.: on bark of tree, Balsam Mountains, Sept. 8, 1922, *Schallert 6753* (FM); Eagle Nest, elev. 4700 ft., Aug. 29, 1902, *Curtis* (F); vicinity of Eagle Nest near Waynesville, elev. 900–1500 m., *Standley* (D). SWAIN CO.: open woods, 3 miles south of Smokemont, Aug. 27, 1937, *Hubricht B583* (MBG).

SOUTH CAROLINA: AIKEN CO.: Aiken, *Ravenel* (F). COUNTY UNKNOWN: on twigs, sand dunes, Pawleys Island, Aug. 3, 1936, *Schallert* (MBG).

FLORIDA: ORANGE CO.: on palmetto logs, Sanford, Mar. 1906, *Rapp VII* (F); on *Myrica*, in swamp, Sanford, *Rapp* (BPI). DUVAL CO.: on *Taxodium*, Jacksonville, 1892, *Calkins* (F). LAKE CO.: on bark of trees, Eustis, May 28 to June 15, 1895, *Nash 1836* (MIN, WIS). MARION CO.: Ocala, Jan. 29, 1891, *Underwood* (F). ESCAMBIA CO.: on oak bark, Pensacola, Dec. 1937, *Fassett* (WIS).

ALABAMA: MARSHALL CO.: open woods, 3.2 miles north of Boaz, July 21, 1939, *Hubricht B1548* (MBG).

LOUISIANA: ACADIA CO.: on trunk of trees, Sept. 17, 1894, *Langlois 997* (D).

OHIO: FRANKLIN CO.: Columbus, July 12, 1892, *Bogue L84* (O); Georgesville, July 15, 1892, *Bogue L65* (O). CLINTON CO.: New Antioch, Jan. 16, 1901, *Vandemark* (O).

MICHIGAN: OAKLAND CO.: on dead cedar, Thomasville, Aug. 26, 1902, *Fink* (F). KEWEENAW CO.: on rock face at tip of mat of spruce needles in shade, Tobins Harbor, July 14, 1930, *Lowe* (F).

KENTUCKY: KNOX CO.: open woods, 1.4 miles north of Jarvis Store, Aug. 19, 1937, *Hubricht B308* (MBG). LAUREL CO.: deep, wet woods, 8.4 miles north of East Bernstadt, Aug. 18, 1937, *Hubricht B266* (MBG).

TENNESSEE: HAMILTON CO.: on pine trees and rocks, Lookout Mountain, *Calkins 283* (MIN). CARTER CO.: Roan Mountain, *Thaxter* (F). SEVIER CO.: edge of woods, 2.3 miles north of Gatlinburg, Aug. 25, 1937, *Hubricht B454* (MBG). CLAIBORNE CO.: open woods near mouth of Indian Creek, Aug. 21, 1937, *Hubricht B366* (MBG).

ILLINOIS: MENARD CO.: Athens, *Hall* (WIS).

MINNESOTA: LAKE CO.: on rocks, Snowbank Lake, June 26, 1897, *Fink* (F). CARLTON CO.: on trees, Tafte, Carlton Peak, July 10, 1897, *Fink 527* (MIN).

IOWA: CLAYTON CO.: on trees, Sept. 1894, *Fink* (WIS).

MISSOURI: ST. FRANCOIS CO.: on trees, Pickle Springs, May 21, 1938, *Berry 1341* (MBG); on sandstone ledge, Pickle Springs, May 21, 1938, *Berry 1338* (MBG). GREENE CO.: bark of tree, rocky wooded bank of James River, 8 miles south of Springfield, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

ARKANSAS: NEWTON CO.: on bark of tree, steep dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); moist woods on gentle slope near



falls, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG). SEARCY CO.: open wooded hillside, 4 miles west of Marshall, *Dodge, Berry & Johnson* (MBG). BOONE CO.: rocky wooded bluff, above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

TEXAS: HARRIS CO.: on oak, Houston, Jan. 7, 1917, *Fisher* (F).

BRITISH COLUMBIA: on trees, west coast of Vancouver Island, June 18, 1906, *Macoun* (F).

WASHINGTON: SAN JUAN CO.: on log lodge, Olga, July 16, 1906, *Fink 344* (M).

CALIFORNIA: MONTEREY CO.: cypress headland, Point Lobos Reserve, elev. 75 ft., July 11, 1936, *Wheeler* (MBG). LOS ANGELES CO.: on live oak, divide at head of Banning's Canyon, Santa Catalina Island, Apr. 24, 1921, *Knopf* (F). COUNTY INDEFINITE: on roof of an old house on sea beach near Pillar Point, elev. 10 ft., Aug. 14, 1903, *Herre* (LSU,F).

LOCAL AND FOREIGN EXSICCATAE EXAMINED: Cum. I 8; Elenk. 52 a-c; Flag. Lich. Fr.-C. 16; E. Fries, 335; Funck, I 661; Hav. 325; Johns. 23; Larb. Herb. 291; Leight. 76; Lojk. Univ. 111; Malbr. 65; Mig. 90; Oliv. 9; Rab. 912; Rab. Cent. 22; Roum. 38; Salw. 148; Schaer. 360; Spruce, 127; Tuck. 15; Wain. 538b; Welw. 75, 77.

**46a. *Parmelia perlata* var. *ciliata* Duby, Bot. Gallic. 2: 601. 1830.**

*Lobaria perlata* var. *ciliata* DC. apud Lam. & DC., Fl. Fr. ed. 3, 2: 403. 1815.

*Parmelia submarginalis* Eaton, Man. Bot. N. Amer. ed. 5, 316. 1836 (non Ach.).

*Parmelia ciliata* Nyl., Flora 61: 247. 1878.

DeCandolle used as a type of the variety a plant collected in Switzerland, which is now in his herbarium in Geneva, Switzerland. Duby cites DeCandolle in his transfer of the variety to the genus *Parmelia*, but gives no reference to the actual existence of a type. The plants he studied were from eastern France. Nylander's herbarium in Helsinki, Finland, contains a collection designated *Parmelia ciliata* which may be the type of his species.

There is a collection in Tuckerman's herbarium designated *Parmelia submarginalis* which is evidently co-type with Eaton's type in Kew. This plant is *Parmelia perlata* var. *ciliata*. In his 'Cat. Lich. Univ.' 6: 244. 1930, Zahlbruckner cites *Parmelia Michauxiana* as superseding *Parmelia submarginalis*. *Parmelia Michauxiana* Zahl. is non-valid because of prior use by Acharius (Lichenogr. Univ. 492. 1810).

The variety is the same as the species except that the mar-



gins of the variety are sparingly beset with strong black cilia and occasionally there are coralloid branchlets and cilia arising from the upper surface of the thallus. The chemical reaction and internal morphology are the same as those of the species.

Distribution: Tennessee to Minnesota.

TENNESSEE: HAMILTON CO.: on rocks and trees, Lookout Mountain, *Calkins 12* (MBG).

MINNESOTA: CARLTON CO.: on rocks, Kettle Falls, Aug. 15, 1901, *Fink 1496* (MIN); on cedar, Thomasville, Aug. 25, 1902, *Fink 5411* (MIN).

FOREIGN EXSICCATAE EXAMINED: Malbr. 315; Cromb. 30; Hepp. Zür. 41; Larb. Caes. 17; Larb. Herb. 86.

**47. *Parmelia cetrarioides* Del. apud Duby, Bot. Gallic. 2: 601. 1830.**

*Parmelia olivaria* f. *cetrarioides* Merrill, Bryol. 11: 95. 1908.

Delise's type was from northern France, and is now in his herbarium in Strasbourg. Merrill's type was collected in southern Canada by J. Macoun and is in the Farlow Herbarium.

Thallus large, 8–20 cm. diameter, loosely adnate; upper surface somewhat wrinkled, cortex often cracked or broken, exposing a white medulla, lobes short, wide, round, greenish-gray to greenish-brown, margins crenulate, slightly raised, without cilia, occasionally with scattered soredia; lower surface black with brown margins, few small black rhizinae at points of contact with the substratum; apothecia rare, 2–10 mm. diameter, disks concave or flat, chestnut-brown, amphithecium thin, smooth, only slightly dissected; K, cortex and medulla generally yellow-green; C, medulla yellow, K + C, yellow, P, red-brown.

Algal layer continuous, 28–36  $\mu$  thick; upper cortex 16–20  $\mu$  thick; medulla of loosely interwoven hyphae of large diameter; lower cortex 32–36  $\mu$  thick; thallus 180–200  $\mu$  thick; thecium 48–60  $\mu$ ; ascus clavate, spores 8, 6–8  $\times$  12–16  $\mu$ ; paraphyses branched.

Distribution: Nova Scotia to Florida, west to California.

NOVA SCOTIA: CUMBERLAND CO.: on trees, Truro, May 10, 1891, *Macoun* (Type of *P. olivaria* f. *cetrarioides*) (F). COUNTY UNKNOWN: *Rothrock* (FM).

QUEBEC: on rock, wet when collected, Ste. Anne, Apr. 27, 1935, *Lepage 200* (D); adherent to dry rock, Ste. Anne, May 2, 1935, *Lepage 140* (D); on mossy rocks, Ste. Anne, May 15, 1935, *Lepage 489* (D).



ONTARIO: on large trunks in woods, Ottawa, May 15, 1891, *Macoun* (MBG); on trees, Goulais Point, Aug. 4, 1869, *Macoun* (MBG); on trees in a swamp, Beechwood, Apr. 27, 1892, *Macoun* (MIN).

MAINE: KNOX CO.: on trunks of various trees, Rockland, Sept. 28, 1909, *Merrill 99* (MIN).

NEW HAMPSHIRE: COOS CO.: on rocks, Cherry Mountain, Aug. 8, 1895, *Harper & Harper* (FM); base of Mount Washington, Aug. 6, 1895, *Harper & Harper 47* (FM); near Gate of Notch, June 1882, *Faxon* (MBG,WIS). GRAFTON CO.: on rocks, Franconia Mountains, July 1891, *Cummings* (MBG); on rocks, North Woodstock, Franconia Mountains, July 1891, *Cummings 8* (WIS). BELKNAP CO.: Gilmanston, 1863, *Hall 30* (FM). HILLSBORO CO.: *Lapham* (WIS). CHESHIRE CO.: on rocks, Fitzwilliam, Aug. 1850, *Russell* (FM).

VERMONT: RUTLAND CO.: exposed ledges, Mount Pico, elev. 2500 ft., May 12, 1911, *Dutton* (WIS); Todmer area, Pawlet, June 26, 1913, *Dodge* (D); bare ledges, region of the Silver Mine, Birch Hill, Brandon, July 3, 1920, *Dutton* (MBG).

MASSACHUSETTS: MIDDLESEX CO.: on rocks, New Bedford, *Willey 34* (MIN).

NEW YORK: YATES CO.: Penn Yan, *Buckley* (MBG).

PENNSYLVANIA: PIKE CO.: Matamoras, Sept. 24, 1886, *Schneider* (MBG,MIN). LANCASTER CO.: Mountville, May 18, 1888, *Eby* (MBG); Conewago, Apr. 23, 1892, *Small* (MBG,MIN); on rocks, Rheinholds, Sept. 3, 1894, *Eby* (MBG); Bear Town, Sept. 16, 1895, *Eby* (MBG); on rails, Landis Valley, Oct. 1892, *Eby* (MBG); on rocks, Bear Town, Oct. 1895, *Eby* (MBG); Kissel Hill, July 17, 1895, *Eby* (MBG); on trees, Kissel Hill, Oct. 1895, *Eby* (MBG).

NORTH CAROLINA: MITCHELL CO.: on bark of tree, Roan Mountain, June 15, 1936, *Schallert* (B). HAYWOOD CO.: on oak trees, vicinity of Eagles Nest, near Waynesville, elev. 1000-1500 m., Sept. 12, 1910, *Standley* (US). SWAIN CO.: wet woods, Clingmans Dome, elev. 6600 ft., Aug. 10, 1939, *Hubricht B1579* (MBG). MC DOWELL CO.: Mount Mitchell, June 5, 1929, *Youngken 9* (BPI). COUNTY INDEFINITE: bark of tree, Great Smoky Mountains, June 13, 1936, *Schallert* (B).

FLORIDA: ORANGE CO.: on trunks of *Myrica*, Sanford, Dec. 1907, *Rapp* (MBG).

OHIO: CHAMPAIGN CO.: in cedar swamp, Aug. 9, 1892, *Werner L453* (O).

MICHIGAN: KEWEENAW CO.: Isle Royale, Aug. 7, 1901, *Stuntz & Allen 33* (WIS); covering boulders and cliffs, Rock Harbor, Isle Royale, Aug. 1904, *Harper & Harper 160* (FM).

WISCONSIN: VILAS CO.: valley of the Wisconsin River, near Conover, June 26, 1893, *Cheney 798* (WIS). MARATHON CO.: valley of the Wisconsin River near Granite Heights, Summer 1894, *Cheney 3014* (WIS). COUNTY INDEFINITE: valley of the Wisconsin River, near Doherty Lake, Summer 1893, *Cheney 1150* (WIS).

MINNESOTA: COOK CO.: on rocks, Grand Portage Island, June 24, 1897, *Fink 169* (MIN); on cedar, Grand Marais, Aug. 2, 1902, *Fink 5284* (MIN). LAKE CO.: on rocks, Snowbank Lake, June 26, 1897, *Fink* (D); on trees, Beaver Bay, July 14, 1897, *Fink 725* (MIN). ST. LOUIS CO.: on mossy rocks, frequent, Harding, Aug. 19, 1901, *Fink 1612* (MIN). CARLTON CO.: on rocks, common, Kettle Falls, Aug. 10, 1901, *Fink 1366* (MIN). KOOCHICHING CO.: on cedars in swamp, rare, Koochiching, July 29, 1901, *Fink 998* (MIN); on rocks, Gunflint, July 1, 1897, *Fink 368* (MIN); on mossy rocks, frequent, Rainy Lake City, Aug. 5, 1901, *Fink 1214* (MIN). COUNTY UNKNOWN: on rocks, South Fowl Lake, June 26, 1897, *Fink 205* (MIN); on trees, Misquah Hills, July 5, 1897, *Fink 543* (MIN).



WASHINGTON: SNOHOMISH CO.: on trees, Maryville, Jan. 1926, *Grant* (F).  
ISLAND CO.: Goose Rock, Langley, July 1923, *Grant* (D).

CALIFORNIA: ORANGE CO.: Laguna Beach, elev. 50 ft., June 10, 1930, *Reed* (MBG).

**47a. *Parmelia cetrarioides* var. *rubescens*** (Th. Fries) DR.,  
*Nyt. Mag.* **62**: 75. 1924.

*Parmelia perlata* f. *rubescens* Th. Fries, *Lichenogr. Scand.*  
**1**: 112. 1871.

Fries' type was collected in Norway and is in Upsala. Du-Rietz's type was from the mountains of southern Europe, and is now in the Paris Museum, France.

The variety has a very limited distribution and may be only an environmental variant. It differs from the species only in the chemical reaction with KOH. In the variety the medulla becomes reddish-brown when treated with KOH, while CaOCl<sub>2</sub> gives no reaction.

Distribution: found only in the southern part of Pennsylvania.

PENNSYLVANIA: PHILADELPHIA CO.: on fence rails, Chestnut Hill, Oct. 1886, *Eby* (MBG). LANCASTER CO.: on fences, Kissel Hill, Oct.—July 1895, *Eby* (MBG).

FOREIGN EXSICCATAE EXAMINED: *Claud.* 66; *Harm. Lich. Loth.* 288; *Mus. Krypt. Exs. Vind.* 1365.

**48. *Parmelia crinita*** Ach., *Syn. Meth. Lich.* 196. 1814.

*Imbricaria crinita* Ach. apud Arn., *Flora* **67**: 159. 1884.

The type of *Parmelia crinita* was a collection of Muhlenberg's from eastern North America, probably Pennsylvania. The type is now in Acharius' herbarium in Helsinki, Finland.

Arnold cites *Imbricaria crinita* Ach. as a related species. Nothing is known of a type for *Imbricaria crinita*.

Type locality: eastern North America (probably Pennsylvania).

Thallus 4–18 cm. diameter, loosely adnate; upper surface with many granules or isidia, pale green or gray-green, lobes broad, irregular, margins slightly ciliate, wavy and dissected; lower surface brown at the margins, black with many rhizinae at the center; apothecia not common, 3–13 mm. diameter, disks chestnut-brown, concave, amphithecia irregular, often with



isidia or granules, sometimes ciliate; K, yellow, C, none, K + C, none, P, none.

Algal layer continuous, 28–30  $\mu$  thick; upper cortex 24–28  $\mu$  thick, matrix light brown; medulla loosely interwoven with hyaline hyphae of small diameter; lower cortex 35–40  $\mu$  thick, matrix black or brown; thickness of thallus 304–320  $\mu$ ; thecium 40–60  $\mu$  thick; ascus clavate, spores 8, 6–8  $\times$  12–16  $\mu$ ; paraphyses branched with the tips enlarged.

Distribution: Ontario to Florida, west to British Columbia and Washington.

ONTARIO: on trees in woods, Brighton, Oct. 18, 1893, *Macoun 175* (WIS); on trees in woods, Brighton, Oct. 18, 1893, *Macoun* (MBG,MIN).

MAINE: KNOX CO.: Rockland, Sept. 8, 1909, *Merrill 124* (MIN); Rockport, Nov. 1904, *Merrill 844* (F); on the trunks of an old birch, solitary, Rockland, Aug. 10, *Merrill* (F); 1839, *DeLaski* (FM).

MASSACHUSETTS: BRISTOL CO.: on trunks and rocks, New Bedford, *Willey 28* (FM); on trees, Hingham, *Russell* (FM); New Bedford, *Willey 38* (FM); New Bedford, 1862–1898, *Willey* (US). PLYMOUTH CO.: Plymouth, Mar. 1884, *Faxon* (F).

VIRGINIA: LEE CO.: edge of woods, Hunters Gap, Powell Mountain, 2.7 miles north of Blackwater, *Hubricht B393* (MBG).

NORTH CAROLINA: ROWAN CO.: Dunn's Mountain, Aug. 21, 1894, *Small* (MIN). HENDERSON CO.: on bark of tree, Flat Rock, Mar. 1, 1921, *Schallert 1969* (FM). HAYWOOD CO.: Sunburst, elev. 3200 ft., June 1913, *House* (NYBG).

SOUTH CAROLINA: AIKEN CO.: Aiken, *Ravenel* (MBG).

GEORGIA: THOMAS CO.: Thomasville, Aug. 1906, *Taylor* (F); on trees, Thomasville, *Taylor* (F).

FLORIDA: LAKE CO.: Eustis, May 28, 1895, *Nash* (MBG).

ALABAMA: BALDWIN CO.: on magnolia, Attler, Mar. 29, 1925, *Evans* (NYBG); on trees, Fairhope, Oct. 7, 1924, *Evans* (NYBG); trees on the beach, Daphne, Oct. 15, 1924, *Evans* (NYBG); base of trees near Rock Creek, Feb. 27, 1925, *Evans* (F).

MISSISSIPPI: HARRISON CO.: Biloxi, Sept. 15, 1891, *Seymour* (F). TATE CO.: 2 miles north of Coldwater, Dec. 27, 1938, *E. Anderson* (MBG).

LOUISIANA: ST. MARTIN CO.: on tree trunks, St. Martinsville, *Langlois* (NYBG).

OHIO: FRANKLIN CO.: Georgesville, July 15, 1892, *Bogue* (O).

MICHIGAN: FAYETTE CO.: on tree, 1893, *Fink* (MBG).

TENNESSEE: HAMILTON CO.: on trees, Lookout Mountain, *Calkins* (NYBG,MBG).

ILLINOIS: MENARD CO.: on tree, 1878, *Hall* (FM); *E. Hall 6* (FM).

WISCONSIN: WALWORTH CO.: on trees, Springfield, May 27, 1893, *Heald & Buell* (WIS). MARATHON CO.: valley of the Wisconsin River, near Knowlton, Summer 1894, *Cheney* (WIS).

MINNESOTA: COOK CO.: on rocks, Grand Portage, June 23, 1897, *Fink* (M); on rocks, Grand Portage, June 25, 1897, *Fink 114* (MIN). BLUE EARTH CO.: on trees, rare, Mankato, June 23, 1899, *Fink 47* (MIN); on trees, rare, Mankato, June 27, 1899, *Fink 133* (MIN). YELLOW MEDICINE CO.: on trees and rocks, Granite Falls,



July 11, 1899, *Fink 439* (MIN). CLAY CO.: on trees, rare, near Ulen, July 4, 1899, *Fink 228* (MIN); on mossy rocks in shade, rare, near Ulen, July 5, 1899, *Fink 258* (MIN). KOOCHICHING CO.: on rocks, Gunflint, July 1897, *Fink 362* (MIN). CARLTON CO.: on trees, Taft, July 19, 1897, *Fink 133* (MIN).

IOWA: MUSCATINE CO.: on bark, Wild-cat-den, Nov. 1897, *Shimek* (IA). FAYETTE CO.: on trees, Mar. 1893, *Fink* (MIN,WIS,M).

MISSOURI: DUNKLIN CO.: on tree trunks, St. Francis, Aug. 20, 1897, *Trelease* (MBG). WRIGHT CO.: on dead *Acer saccharum*, 2 miles southwest of Mansfield, elev. 1480 ft., June 5–12, 1911, *Lansing Jr. 3200* (FM).

ARKANSAS: BOONE CO.: rocky wooded bluff, above dry creek bed, Bear Creek Spring, 0.5 mile north of Francis, Apr. 7, 1939, *Dodge, Berry & Johnson* (MBG).

KANSAS: DOUGLAS CO.: on trees, Nov. 1896, *Bridwell 1185* (F).

TEXAS: GILLESPIE CO.: *Jermy 424* (MBG). BEXAR CO.: mesquite woods, 1.5 miles southeast of junction of Jolly Lane and Atkins-Elmendorf Lane, 18 miles east of San Antonio, May 17, 1940, *Hubricht B1886* (MBG).

BRITISH COLUMBIA: on the old wharf, Comex, Vancouver Island, June 24, 1893, *Macoun 149* (MIN); June 1915, *Macoun 19* (F); on trunks in woods, Ucluelet, Vancouver Island, May 11, 1909, *Macoun* (MBG).

WASHINGTON: SKAGIT CO.: on rocks, Anacortes, July 12, 1908, *Frye* (D).

**49. *Parmelia cristifera* Tayl., Hook. London Jour. Bot. 6: 165. 1847.**

The type of the species was collected by Wallich in Calcutta, India. The type plant is in Taylor's Herbarium in the Boston Society of Natural History.

Thallus 5–15 cm. diameter, adnate; upper surface smooth, greenish-gray to ashy or white, lobes round and broad, margins raised, bearing globose powdery soredia; lower surface with brown margins, naked, black at the center with a few black rhizinae; apothecia rare; K, upper cortex yellowish-green, medulla reddish-brown; C, none, K + C, medulla brown, P, red-brown.

Algal layer continuous, 16–20  $\mu$  thick, matrix hyaline; medulla hyphae loosely interwoven, hyaline; lower cortex 20–28  $\mu$  thick, matrix black; thickness of thallus 120–125  $\mu$ ; thecium 60–96  $\mu$  thick; ascus clavate, spores 8, 2–4  $\times$  6–8  $\mu$ ; paraphyses branched.

Distribution: North Carolina to Florida, west to California.

NORTH CAROLINA: FORSYTH CO.: Bennetts Rock, Apr. 10, 1936, *Schallert* (MBG). HENDERSON CO.: Hendersonville, Apr. 1910, *Plitt 268* (F). JACKSON CO.: on bark of tree, Balsam Mountains, Sept. 8, 1922, *Schallert 6753* (WIS).

GEORGIA: THOMAS CO.: on oak bark, Thomasville, Aug. 1906, *Taylor* (F).

FLORIDA: DUVAL CO.: on trees, Jacksonville, *Calkins 10* (US). ORANGE CO.: on



fence, Mar. 1907, *Rapp* (F); Sanford, Mar. 1907, *Rapp* (F); on *Melia*, Sanford, May 1905, *Rapp* 9 (F). LAKE CO.: Eustis, June 16, 1895, *Nash* 2037 (US). HILLSBORO CO.: north side of dead stump, Tampa, Aug. 1898, *Ferguson* (US). LEE CO.: on cypress trees, Fort Myers, Mar. 17, 1916, *Standley* 326 (MBG).

ALABAMA: BALDWIN CO.: on *Melia*, Fairhope, Feb. 25, 1925, *Evans* (F).

ARKANSAS: CHICOT CO.: near Macon, Dec. 29, 1938, *E. Anderson* (MBG). WHITE CO.: near Judsonia, Dec. 28, 1938, *E. Anderson* (MBG).

OKLAHOMA: COMANCHE CO.: vicinity of Fort Sill, May 20, 1916, *Mrs. J. Clemens* (D).

TEXAS: HARRIS CO.: on *Pinus glabra*, Clinton, Mar. 22, 1925, *Thurow* (F). DENTON CO.: on *Quercus minor*, 3 miles southwest of Denton, Feb. 1935, *Bussard VII & VIII* (MBG). COMAL CO.: Packsaddle, 500 ft. above the bed of Guadalupe River, 1916, *Stafford* (MBG). BEXAR CO.: semi-shade to full sun, 1 mile southwest of Selma, May 22, 1938, *Hubricht B762* (MBG). GILLESPIE CO.: *Jermy* 873 (MBG). LA SALLE CO.: Millett, Nov. 1897, *Trelease* (US). CULBERSON CO.: full sun to semi-shade, north side of summit of Van Horn Mountains, 15 miles south of Van Horn, June 2, 1938, *Hubricht B951* (MBG).

CALIFORNIA: SAN DIEGO CO.: on dry bushes, Camp Kearney, Mesa, elev. 600 ft., 1932, *Cota* (MBG).

**50. *Parmelia perforata* (Wulf.) Ach., Meth. Lich. 217. 1803.**

*Lichen perforatus* Wulf. apud Jacq., Collect. 1: 116. 1786.

*Platisma perforatum* Hoffm., Descr. & Adumbrat. Pl. Lich. 1: 65. t. 13, f. 1. 1790.

Wulfen's type was from a plant collected in central Europe. Its present location is unknown, but the plate shown by Jacquin is in agreement with the description. Hoffmann cites Wulfen's *Lichen perforatus* as synonymous with his plant. His type is unknown. Acharius' plant was collected by Michaux in the eastern part of North America. His type is in Helsinki, Finland, with a co-type in Upsala, Sweden.

Thallus large, loosely adnate; upper surface smooth, greenish-gray to brownish-gray, lobes round, wide, with raised margins, becoming subfruticose, dissected and imbricate, with a fringe of black cilia, spotted with numerous black ostioles of spermagonia; lower surface black at the center, with numerous black rhizinae, margins naked, white or brown; apothecia numerous, 1–15 mm. diameter, short-pedicellate, lower sides reticulate, ridged, disks brown to chestnut-brown, concave or flat, usually perforate in the center, margins wavy and broken; K, yellow becoming pink or red, C, none, K + C, pink, P, none.

Algal layer continuous, 40–45  $\mu$  thick; upper cortex 28–30  $\mu$



thick, matrix brown; medulla hyphae loosely interwoven, of one type, hyaline and of small diameter; lower cortex 16–32  $\mu$  thick, matrix black; thallus 250–266  $\mu$  thick; thecium 26–40  $\mu$  thick; ascus clavate, spores 8, 5–8  $\times$  9–12  $\mu$ ; paraphyses branched, enlarged at the tip.

Distribution: Massachusetts to Florida, west to California.

MASSACHUSETTS: BRISTOL CO.: on trunks, common, New Bedford, *Willey 31* (FM); trunks, New Bedford, *Willey 30* (FM); New Bedford, 1908, *Everhart* (MBG). PLYMOUTH CO.: Hingman, 1846, *Russell* (FM). WORCESTER CO.: on rocks, Lunenburg, 1883, *Sargent 219* (F). NORFOLK CO.: Wellesley, Dec. 21, 1883, *Cummings* (WIS). COUNTY UNKNOWN, 1863, *Mann* (FM); on rocks, *Russell* (WIS).

CONNECTICUT: NEW HAVEN CO.: New Haven 1855, *Eaton* (F).

NEW YORK: SUFFOLK CO.: East Port, Long Island, June 24, 1894, *Schrenk* (MBG). YATES CO.: Penn Yan, *Buckley* (F).

NEW JERSEY: CUMBERLAND CO.: on various trees, Vineland, Dec. 1893, *Walker 22* (FM, MBG, WIS, MIN).

PENNSYLVANIA: CHESTER CO.: on rocks, Nov. 10, 1879, *Rothrock* (FM); on living and dead trees, common, Mar. 27, 1879, *May & Rothrock* (FM). LANCASTER CO.: on oak trees, Conewago, Nov. 25, 1852, *Heller* (F); on rails, Rheinholds, Mar. 14, 1896, *Eby* (MBG).

MARYLAND: BALTIMORE CO.: on fence rail, Sept. 19, 1909, *Plitt* (F). CAROLINE CO.: on plum tree, Denton, Apr. 1898, *Waugh* (F).

NORTH CAROLINA: FORSYTH CO.: on twigs, Niford Rock, June 1, 1934, *Schallert* (B); on bark of tree, Winston-Salem, Apr. 12, 1921, *Schallert 1289* (WIS, F). BUNCOMBE CO.: vicinity of Montreal, Sept. 1, 1913, *Standley & Bollman* (F). HENDERSON CO.: on bark of tree, Flat Rock, Mar. 1, 1921, *Schallert 1286* (FM); on bark of tree, Flat Rock, Mar. 1, 1922, *Schallert 6752* (FM); on exposed rock, Flat Rock, Mar. 12, 1921, *Schallert 1289* (FM).

SOUTH CAROLINA: BEAUFORT CO.: on twigs, sand dunes, Pawleys Island, Aug. 2, 1936, *Schallert* (B). SPARTANBURG CO.: Glenn Springs, *Ravenel* (T).

FLORIDA: ORANGE CO.: trunk of orange tree, Lake Mary, Feb. 14, 1909, *Rapp* (F). DUVAL CO.: shrubs, Jacksonville, *Calkins* (MBG). CLAY CO.: June 21, 1879, *Martin* (FM). COUNTY UNKNOWN: winter of 1879–80, *Martin* (FM).

ALABAMA: MOBILE CO.: Mobile, 1852, *Litsbee* (FM); Mobile, *Mohr* (MBG). LEE CO.: limbs, Auburn, Jan. 9, 1897, *Earle & Baker* (MBG).

LOUISIANA: PLAQUEMINES CO.: on trees, Pointe a la Hache, 1884, *Langlois 36* (MBG). LA FOURCHE CO.: Kraemer, Apr. 18, 1936, *Hubricht* (MBG). COUNTY UNKNOWN: May 7, 1889, *Langlois 363* (MBG).

OHIO: ADAMS CO.: Mineral Springs, Oct. 24, 1900, *Kellerman* (O). CLARK CO.: Luyden Wood, Springfield, Feb. 9, 1877, *Biddlecombe* (O); near Springfield, 1872, *Spence* (O). CHAMPAIGN CO.: cedar swamp, Sept. 10, 1892, *Weaver* (W).

WEST VIRGINIA: COUNTY UNKNOWN: on trees, *Gray* (F).

TENNESSEE: CLAIBORNE CO.: open woods, 8 miles east of Tazewell, Aug. 22, 1937, *Hubricht B368* (MBG). HAMILTON CO.: on pine bark, Lookout Mountain, *Calkins 7* (FM).



WISCONSIN: LAFAYETTE CO.: Fayette, July 15, 1894, *Cheney 9220* (WIS).

ILLINOIS: MENARD CO.: on trees, 1878, *Hall* (FM); *Hall 4* (FM); Athens, 1864, *Hall* (FM); Athens, 1878, *Hall* (FM,T,BSNH,MBG). COUNTY UNKNOWN: on trees, *Calkins* (FM).

MINNESOTA: BLUE EARTH CO.: on trees, rare, Mankato, June 26, 1899, *Fink 134* (MIN).

IOWA: HENRY CO.: on bark, Jan. 1, 1898, *Savage* (IA).

MISSOURI: WAYNE CO.: old trees, Williamsville, Mar. 1898, *C. Russell* (MBG). FRANKLIN CO.: bark of tree, Gray Summit, Nov. 15, 1936, *Berry* (MBG).

ARKANSAS: NEWTON CO.: high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); steep dry wooded bluff with rocky flat top, 1 mile south of Ponca, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG); wooded hillside, 11 miles south of Harrison, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG). CONWAY CO.: Petit Jean State Park, May 5, 1940, *Hubricht B1917* (MBG).

KANSAS: DOUGLAS CO.: on trees, Nov. 1896, *Bridwell 87* (F).

OKLAHOMA: COMANCHE CO.: vicinity of Fort Sill, May 20, 1916, *Mrs. J. Clemens* (MBG).

TEXAS: GALVESTON CO.: Galveston, *Hall* (FM). HARRIS CO.: Houston, *Hall* (FM); on living oaks, La Port, elev. 15 ft., Jan. 9, 1939, *Fisher* (MBG). DENTON CO.: three miles southwest of Denton, 1935, *Bussard* (MBG). GILLESPIE CO.: Coal Creek, *Jermy 423* (MBG). BEXAR CO.: mesquite woods, 1.5 miles southeast of junction of Jolly Lane and Atkins-Elmendorf Lane, 18 miles east of San Antonio, May 17, 1940, *Hubricht B1892* (MBG); semi-shade to full sun, 1 mile southeast of Selma, May 22, 1938, *Hubricht B768* (MBG).

CALIFORNIA: SONOMA CO.: mossy sandstone, Stony Point near Searsville, elev. 400 ft., July 9, 1903, *Herre* (F). LOS ANGELES CO.: on *Quercus dumosa*, mountain top, Santa Catalina Island, June 12, 1920, *Nuttall* (FM). SAN DIEGO CO.: on trees, Alpine Creek, elev. 1000 ft., July 28, 1903, *Herre* (MIN); San Diego, 1888, *Palmer* (MBG).

**50a. *Parmelia perforata* var. *hypotropa* Nyl., Syn. Lich. 1: 378. 1860.**

Nylander's type of the variety was collected on trees in Texas, and is in his herbarium in Helsinki, Finland.

The variety differs from the species only in the small size of the thallus and the light lower surface.

Distribution: Florida west to Texas.

FLORIDA: DUVAL CO.: on trees, mouth of St. Johns River, Mar. 31, 1921, *Kelly* (BPI); PALM BEACH CO.: 1898, *Thaxter 2043* (F).

TEXAS: BLANCO CO.: on oaks, Blanco, 1848, *Wright* (T). BRAZOS CO.: Bryan, June 22, 1919, *Nelson* (BPI).

**51. *Parmelia proboscidea* Tayl. apud Mack., Fl. Hibern. 2: 143. 1836.**

*Parmelia frondifera* Merrill, Bryol. 11: 91. 1908.



Taylor's type was collected in Dunkerron, Ireland, and is now in his herbarium in the Boston Society of Natural History. Merrill's type was collected by Macoun at Peele Point, Ontario, Canada, and is now in the Farlow Herbarium.

Thallus large, round, adnate, upper surface covered with finely divided lobules, white globose soredia common on the older parts, margins with fine cilia; lower surface brown at the margins, black at the center, with many black rhizinae; apothecium 9–15 mm. diameter, pedicellate, abundant, disk deeply concave, chestnut-brown, not perforate, amphithecium sometimes fissured with vertical ridges; K, yellow, C, none, K + C, none, P, none.

Algal layer continuous, 18–30  $\mu$  thick; upper cortex 36–38  $\mu$  thick, matrix brown; upper portion of medulla of loosely interwoven, small, hyaline hyphae, lower portion of brown hyphae of large diameter; lower cortex 24–30  $\mu$  thick, matrix dark brown or black; thickness of thallus 105–120  $\mu$ .

Distribution: Ontario to Florida, west to Texas.

ONTARIO: on trees, Peele Point, 1890, *Macoun* (F).

MASSACHUSETTS: BRISTOL CO.: on trunks, common, New Bedford, *Willey* 31 (FM).

MARYLAND: ANNE ARUNDEL CO.: on decaying trunk of tree in woods, Cornfield Creek, Aug. 26, 1906, *Plitt* (D).

FLORIDA: ORANGE CO.: on trees, Sanford, May 5, 1922, *Rapp* (D); on oak trunks, Sanford, Aug. 12, 1906, *Rapp* (D); on trees, Sanford, Mar. 1920, *Rapp* (WIS); Sanford, Jan. 24, 1909, *Rapp* 26 (F).

TENNESSEE: COUNTY UNKNOWN: on bark of elms, *Calkins* 2 (FM).

TEXAS: BEXAR CO.: semi-shade to full sun, 1 mile southwest of Salem, May 22, 1938, *Hubricht* B769 (MBG).

FOREIGN EXSICCATAE EXAMINED: Wain. 400.

**52. *Parmelia tinctoria*** Despr. apud Nyl., *Flora* 55: 547. 1872.  
*Parmelia praetervisa* Müll.-Arg., *Flora* 63: 276. 1880.

Despreaux's type was collected in the Canary Islands and is now in the Paris Museum, France. Müller-Argau's type was collected by Zollinger in Java, and is now in Geneva, Switzerland.

Thallus large, 15–35 cm. diameter, loosely adnate to bark or wood; upper surface with isidia or coralloid branchlets, wrinkled, light gray to white or ashy in color, lobes large,



round, slightly crinkled, imbricated, with smooth margins; lower surface brown at the margins, black toward the center with very few scattered black rhizinae at the places of contact with the substratum; apothecium 2–8 mm. diameter, subpedicellate, disk concave, light brown to chestnut-brown, amphithecium smooth or slightly isidiose; K, upper cortex yellow; C, medulla none, K + C, none, P, none.

Algal layer continuous, 16–20  $\mu$  thick; upper cortex 16–18  $\mu$  thick, matrix yellow; medulla loosely interwoven, with one type of hyphae; lower cortex 18–20  $\mu$ , matrix dark brown or black; thallus 160–200  $\mu$  thick; thecium 6–70  $\mu$  thick; ascus clavate, spores 8, 4–5  $\times$  8–10  $\mu$ ; paraphyses branched.

Distribution: North Carolina to Florida, west to Texas.

NORTH CAROLINA: FORSYTH CO.: on exposed rock and base of tree, Box Mountain near Walkertown, July 11, 1922, *Schallert 6767* (WIS).

GEORGIA: THOMAS CO.: on trunks, Thomasville, *Taylor* (F); Thomasville, Aug. 24, 1906, *Taylor* (F).

FLORIDA: DUVAL CO.: Jacksonville, *Calkins* (MBG). ORANGE CO.: on fence, Sanford, Mar. 1921, *Rapp* (WIS); on trunks of trees, Sanford, 1909, *Rapp* (F); on fence, Sanford, Dec. 1906, *Rapp* (F). LAKE CO.: Eustis, May 28 to June 15, 1895, *Nash* (F,MBG). HILLSBORO CO.: north side of dead stump, Tampa, Aug. 1898, *Ferguson* (MBG); north side of small oak tree, Tampa, Aug. 7, 1898, *Ferguson* (MBG).

ALABAMA: BALDWIN CO.: on tree, Shelby's, Mar. 17, 1925, *Evans* (F). MOBILE CO.: Mobile, Jan. 1905, *Jones* (MBG).

LOUISIANA: ORLEANS CO.: hardwoods near Indian Village near New Orleans, Dec. 31, 1931, *Dodge* (MBG). LA FOURCHE CO.: on tree, Kraemer, Apr. 15, 1936, *Hubricht* (D). ST. MARTIN CO.: mostly on trunks of trees, St. Martinsville, Jan. 3, 1894, *Langlois* (F); on fences and various trees, St. Martinsville, 1893–1894, *Langlois* (MBG,MIN).

ARKANSAS: CHICOT CO.: near Macon, Dec. 29, 1938, *Anderson* (MBG).

TEXAS: HARRIS CO.: Clinton, Mar. 5, 1925, *Thurrow* (F).

**53. *Parmelia latissima*** Fée, Suppl. Essai Crypt. Ecor. Officin. 119. 1837.

Fée's type was collected on the island of Jamaica and is now in the Paris Museum, France.

Thallus large; upper surface with soledia, ashy to greenish-gray, lobes short, wide, margins round, smooth, somewhat ascending; lower surface chestnut-brown, black at the center, rhizinae scattered, black; apothecium 2–10 mm. diameter, sessile, disk concave, chestnut-brown, amphithecium smooth; K, red, C, intense red, K + C, none, P, brick-red.



Algal layer continuous, 20–40  $\mu$  thick; upper cortex 2–24  $\mu$  thick; medulla of closely interwoven hyphae; lower cortex 20–24  $\mu$  thick, matrix black, thallus 200–250  $\mu$  thick; thecium 140–181  $\mu$  thick; ascus clavate, spores 8, 12–16  $\times$  32–36  $\mu$ ; paraphyses branched, enlarged at the tips.

Distribution: Florida west to Louisiana, north to Arkansas.

FLORIDA: DUVAL CO.: on trees, Jacksonville, *Calkins 341* (FM). ORANGE CO.: on trunks of trees, Sanford, 1909, *Rapp* (MIN); Sanford, Jan. 24, 1909, *Rapp 26* (F); on logs, Sanford, Mar. 1921, *Rapp* (F); on trees, Sanford, Oct. 1923, *Rapp* (BPI); on logs in damp woods, Apr. 1906, *Rapp* (BPI); vicinity of Oviedo, Dec. 1922, *Rapp 660* (BPI). CLAY CO.: Jan. 20, 1879, *Martin* (FM); COUNTY UNKNOWN: on cypress swamps, *Calkins* (NYBG).

ALABAMA: COLBERT CO.: base of tree, near Rock Creek, Feb. 27, 1925, *Evans* (NYBG).

LOUISIANA: ST. MARTIN CO.: on fences and various trees, St. Martinsville, 1893–1894, *Langlois* (WIS,F).

ARKANSAS: NEWTON CO.: 1899, *Trelease* (MBG); high bluff and long steep wooded hillside, Lookout Point, 7 miles south of Jasper, Apr. 8, 1939, *Dodge, Berry & Johnson* (MBG).

#### PSEUDEVERNIA

**IV. *Parmelia* subgenus *Pseudevernia* (Zopf) Berry. n. subgenus.**

*Parmelia* section *Canalicularia* Ach., Meth. Lich. 254. 1803.

*Parmelia* section *Everniiformes* Hue, Nouv. Arch. du Mus. Paris, IV. 1: 135. 1899.

*Pseudevernia* Zopf, Beih. z. Bot. Centr. 14: 124. 1903.

*Parmelia* subgenus *Euparmelia* section 1. *Everniaeformes* Zahlbr. apud Engler & Prantl, Nat. Pflanzenfam. I. Teil, Abt. 1: 212. 1907.

Acharius used the section *Canalicularia* in his 'Meth. Lich.' 254. 1803, to segregate those lichens which have long and narrow erect lobes. This group included *Parmelia villosa* Ach., which has been placed in the genus *Teloschistes* by Norman (Nyt. Mag. 7: 309. 1853), and *Parmelia furfuracea* (L.) Ach., which has been cited as typical by all subsequent workers on this group. Of the remaining twenty species included by Acharius, all have subsequently been placed in other genera. *Parmelia furfuracea* (L.) Ach. is typical of Hue's *Everniiformes*. Zopf established *Pseudevernia* as a genus to include the lobate forms, and considered *Parmelia furfuracea* (L.)



Ach. as the type. Zahlbruckner used *Everniaeformes* to designate the section of the subgenus *Euparmelia* in which he placed the group. His type was *Parmelia furfuracea* (L.) Ach. The writer believes that the lobate forms of the genus *Parmelia* are distinct enough to warrant their being placed in a distinct subgenus, and has designated the use of *Pseudevernia* Zopf in this category, with *Parmelia furfuracea* (L.) Ach. as the type.

Thallus lobes long and narrow, more or less fruticose in growth, usually imbricated, and in some species with strong black marginal cilia; lower surface channeled, rhizinae papillose or absent except at the center of the thallus; spores 8, to an ascus.

The subgenus is distributed throughout the world in the mountainous regions.

KEY TO SPECIES IN SUBGENUS PSEUDEVERNIA

- A. Always with marginal cilia.....54. *cirrhata*  
 A. Never with marginal cilia.  
   B. Lobes flat at tip; plant coarse, usually with soft scales.....55. *furfuracea*  
   B. Lobes cylindrical at tip; plant always delicate.....56. *Cladonia*

**54. *Parmelia cirrhata*** Fries, Syst. Orb. Veget. pars 1: 283. 1825.

*Evernia kamtschadalis* Mont., Ann. Sci. Nat. Bot. II. 18: 17. 1842.

*Evernia americana* Mey. & Fw., Nova Acta Acad. Leopold.-Carol. 14: 211. 1843.

*Parmelia Nepalensis* Tayl., Hook. London Jour. Bot. 6: 172. 1847.

*Parmelia americana* Mont., Ann. Sci. Nat. Bot. III. 18: 309. 1852.

*Parmelia camtschadalis* f. *americana* Nyl., Ann. Sci. Nat. Bot. IV. 11: 215. 1859.

Fries' type was collected in Nepal, India, and at present is in Upsala, Sweden. Montagne described *Evernia kamtschadalis* from a plant collected in Chile, South America. He considered it as closely related to *Borreri furfuracea* Ach. (Lich. Univ. 500. 1810) but with thinner lobes and ciliate margins. Montagne's type is in the Paris Museum, France. Meyer and Flotow based



their *Evernia americana* on a plant collected in Bolivia, South America. Their type is in Berlin, Germany. *Parmelia Nepalensis* of Taylor was based on a collection from Nepal, India, by Wallich, and the type is in Hooker's Herbarium in London, England. Montagne considered the same type in *Parmelia americana* as he used to describe his *Evernia kamtschadalis*. *Parmelia camtschadalis* f. *americana* of Nylander was based on collections from Bolivia and Peru, South America. His type is in Helsinki, Finland. *Parmelia cirrhata* Fr. represents a species with wide distribution in the mountains of the tropics and is an extremely variable species.

Thallus fruticose, upper surface smooth, without soredia or cracks in cortex, lobes flattened, more or less erect, from 2 to 9 mm. broad, tips dichotomously forked, margins always with numerous strong black cilia; lower surface black, smooth or with many strong black rhizinae; apothecium 4–14 mm. diameter, concave to flat, chestnut-brown, margin of apothecium broken or entire; K, none, C, none, K + C, none, P, yellow.

Algal layer continuous, 7–20  $\mu$  thick; upper cortex 40–50  $\mu$  thick, matrix of yellow secretion; medulla hyphae loosely interwoven, hyaline, of one type and less than 1  $\mu$  diameter; lower cortex 30–40  $\mu$  thick, matrix black; thallus 185–200  $\mu$  thick; thecium 35–45  $\mu$  thick; ascus clavate, spores 8–10  $\times$  18–20  $\mu$ , ellipsoid; paraphyses branched.

Distribution: Collected but once in North America, north of Mexico.

CALIFORNIA: SANTA CRUZ CO.: on trees and shrubs, Black Mountain, elev. 1500 to 2700 ft., July 9, 1903, *Herre* (F,LSU).

This species has a wide distribution in Mexico and Central America.

**55. *Parmelia furfuracea* (L.) Ach., Meth. Lich. 254. 1803.**

*Lichen furfuraceus* Linn., Sp. Pl. 1146. 1753.

*Lichenoides furfuraceum* Hoffm., Desc. & Adumbrat. Pl. Lich. 1: 45. t. 9, f. 2. 1790.

*Lobaria furfuracea* Hoffm., Deutschl. Fl. 2: 144. 1795.



*Pseudevernia furfuracea* Zopf, Beih. z. Bot. Centr. **14**: 124. 1903.

The type of Linnaeus was collected in the mountains of central or northern Europe, and is now in the Linnean Herbarium in London. Hoffmann (Desc. & Adumbrat. Pl. Lich. **1**: 45. *t.* 9, *f.* 2. 1790) gives a description and presents a plate which is clearly the same plant designated *Parmelia furfuracea* by Acharius. Hoffmann considered *Lichenoides furfuraceum* as synonymous with his *Lobaria furfuracea*. Acharius cites *Lichen furfuraceus* Linn. and *Lichenoides furfuraceum* Hoffm. as synonymous with *Parmelia furfuracea* Ach. Zopf considered his *Pseudevernia furfuracea* as synonymous with the Linnaean plant.

Thallus greenish-gray or ashy; lobes long, narrow, dichotomously and subpinnately branched, often imbricated, much divided toward the tips, usually bearing soft scales of coralloid branchlets; upper cortex smooth, unbroken by cracks; lower surface light at tips, becoming dark, channeled toward center, without rhizinae except in dark central portion, rhizinae black, short, thick; apothecium short-pedicellate, almost marginal, 3–15 mm. thick, flat or convex, disk brown to brownish-black, abundant, amphithecium smooth, regular, few or no fissures or lobes; K, upper cortex yellow; C, none; K + C, upper cortex yellow, P, medulla yellow.

Algal layer continuous, 21–35  $\mu$  thick; upper cortex 20–30  $\mu$  thick, matrix yellowish-brown; lower cortex 20–30  $\mu$  thick, matrix black or dark brown; medulla of two types of hyphae, those of the central portion of thallus hyaline, 0.5–1  $\mu$  thick, loosely interwoven, those at tips of lobes scattered, dark or black, 2–3  $\mu$  thick; thallus 340–400  $\mu$  thick; thecium 25–30  $\mu$  thick; ascus clavate, 8-spored, 3–5  $\times$  5–8  $\mu$ , arranged irregularly in ascus.

European collections of this species resemble the American collection in every respect. In no instance was it possible to distinguish the plants on the basis of the origin of collection.

Distribution: Maine to South Carolina, west to California.

MAINE: KNOX CO.: on large branches of oak, Pine Hill, Rockport, Oct. 16, 1909, Merrill (F). CUMBERLAND CO.: on *Pinus rigida*, West Falmouth, Mar. 31, 1925, Morton (F).

NEW HAMPSHIRE: CARROLL CO.: Mount Whiteface, Aug. 1934, Dodge (MBG).



MASSACHUSETTS: BRISTOL CO.: New Bedford, 1908, *Everhart* (MBG).

CONNECTICUT: TOLLAND CO.: on trees in a bog, Willington, June 15, 1927, *Evans* (F).

PENNSYLVANIA: PIKE CO.: Matamoras, Sept. 22, 1896, *Schneider* (MBG). LANCASTER CO.: fence rail, Chestnut Hill, Oct. 15, 1894, *Eby* (MBG); Chestnut Hill, July 1889, *Eby* (MBG).

NORTH CAROLINA: AVERY CO.: on coniferous trees, Grandfather Mountain, Aug. 10, 1891, *Seymour* (MBG). BUNCOMBE CO.: pine trunk, vicinity of Montreal, Sept. 1, 1913, *Standley & Bollman 10239* (MBG). COUNTY INDEFINITE: mountains of North Carolina and Georgia, *Buckley* (MBG).

SOUTH CAROLINA: GREENVILLE CO.: Hog Back, Dec. 29, 1892, *Green* (MBG).

WEST VIRGINIA: POCAHONTAS CO.: Charles Creek, Oct. 1923, *Gray L245* (F).

KENTUCKY: BELL CO.: woods, north side of Pine Mountain, 5.5 miles east of Pineville, Aug. 19, 1927, *Hubricht B342* (MBG).

MINNESOTA: COOK CO.: Grand Marais, cedars in a swamp, Aug. 4, 1902, *Fink* (MIN).

TEXAS: BREWSTER CO.: on *Pinus cembroides* on north side of Mt. Emory, Chisos Mountains, July 2, 1837, *Warnock* (MBG); on *Pinus ponderosa*, ridge between Bob Manning and Little Ajuga Canyon, June 17, 1931, *Moore & Steyermark 3800* (MBG).

COLORADO: EL PASO CO.: common on spruce, Palmer Lake, *Bettel* (F); near Pagosa Peak, Aug. 1899, *Baker 95* (MBG).

NEW MEXICO: EDDY CO.: on tree, near Queen, Aug. 12-30, 1924, *Standley 40685* (F). COLFAX CO.: moist soil, vicinity of Ute Park, Aug. 20, 1916, *Standley 13369* (F). SANDOVAL CO.: on branches of balsam and spruce trees, Sandia Mountains, Aug. 8, 1914, *Ellis* (MBG). SOCORRO CO.: shade, San Andres Mountain, Rhodes Pass, 47 miles west of Tularosa, June 1938, *Hubricht B987* (MBG).

ARIZONA: PIMA CO.: dead branches overhanging brook, Manning Camp, Rincon Mountains, Oct. 12, 1909, *Plummer 3470* (MBG). COUNTY UNKNOWN: rolling andesitic pine land recently lumbered, Barfoot Park, Sept. 26, 1906, *Plummer 1429* (MBG); 1909, *Plummer 3470* (MBG).

CALIFORNIA: SAN BERNARDINO CO.: bark and dead wood, *Pseudotsuga macrocarpa*, San Antonio Canyon, San Gabriel Mountains, elev. 4800 ft., Mar. 12, 1933, *Wheeler 1526* (MBG).

FOREIGN AND LOCAL EXSICCATAE EXAMINED: *Ekart*, 8; *E. Fries*, 140; *Funck*, I 11, II 113; *Mus. Krypt. Exs. Vind.* 156; *Malme*, 61; *Oliv.* 165; *Schaer.* 387; *P. furfuracea* f. *ceratea*. *Mus. Krypt. Exs. Vind.* 768; *P. furfuracea* var. *isidiophora* *Mus. Krypt. Exs. Vind.* 876 a, b; *P. furfuracea* subspec. *olivatorina* *Mus. Krypt. Exs. Vind.* 1046; *Malme*, 505; *Evernia furfuracea* f. *ceratea* *Cromb.* 139; *Harm. Lich. Loth.* 258; *Hav.* 251; *Johns.* 67; *Oliv.* 208; *E. furfuracea* f. *curta* *Britz.* 756; *E. furfuracea* f. *nuda* *Britz.* 523; *E. furfuracea* a. *platyphylla* *Rab.* 250 (*Coralloidea*); *E. furfuracea* f. *scobicina* *Hav.* 252; *Johns.* 66; *E. furfuracea* var. *soralifera* *Harm.* 64.

**56. *Parmelia Cladonia* (Tuck.) DR., *Svensk Bot. Tidskr.* 18: 390. 1924.**

*Evernia furfuracea* (L.) Mann var. *Cladonia* Tuck., *Syn. Lich. New England*, 12. 1848.



Tuckerman's type of the variety was based on a collection made in the White Mountains of New Hampshire, and is now in his herbarium in the Farlow Herbarium at Cambridge, Massachusetts. DuRietz cites Tuckerman's type in his transfer of the variety to specific rank in the genus *Parmelia*.

Thallus light greenish-gray, with ascending habit of growth, branching dichotomously, branches smooth, very slender, round and light yellow above but flattened and black toward the base; apothecia unknown; K, brown, C, none, K + C, brown, P, yellow.

Algal layer broken into masses 42–44  $\mu$  in diameter; upper cortex 31.5  $\mu$  thick; lower cortex 31.5  $\mu$  thick; medullary hyphae loosely woven, 2.1  $\mu$  in diameter; thallus 222–240  $\mu$  thick.

*Parmelia Cladonia* (Tuck.) DR. is distinguished from *Parmelia furfuracea* (L.) Ach. by having narrow smooth branches, without isidia or coralloid branchlets. No collections have been made which have apothecia.

Distribution: Nova Scotia to North Carolina.

NOVA SCOTIA: on spruce tree on gypsum cliff, Ste. Croix, Hants County, July 27, 1928, *Prince* (F).

MAINE: KNOX CO.: on twigs, Camden, Oct. 1885, *Merrill* (F); on branches, Mt. Battie, Camden, May 1, 1910, *Merrill* (F). OXFORD CO.: on black spruce in deep bog, Canton, July 31, 1928, *Parlin* (BPI).

NEW HAMPSHIRE: CARROLL CO.: Whiteface Mountain, Aug. 1934, *Dodge* (MBG). GRAFTON CO.: on coniferous trees, Mt. Liberty, Franconia Mountains, Aug. 1892, *Cummings & Seymour 49* (MBG). COOS CO.: White Mountains, top of Mt. Moriah, Sept. 1885, *Farlow 397* (F); White Mountains, *Tuckerman* (Type) (T).

VERMONT: LAMOILLE CO.: twigs of spruce, summit of Mt. Mansfield, 1922, *Merrill* (FM,MBG); Mt. Mansfield, dead tree, June 20, 1924, *Dutton 1694* (MBG); on dead balsam, region Mt. Mansfield, Hell Break Trail, *Dutton 1684* (F). WINDHAM CO.: old barn timbers, Pike Hollow, Wardsboro, July 3, 1935, *Moore* (MBG).

NEW YORK: ESSEX CO.: on balsam, Mt. Marcy, Lake Placid, June 10, 1935, *Darrow 858* (MBG).

MARYLAND: ALLEGHENY CO.: swamp, beyond Frostburg, Aug. 30, 1914, *Plitt 472* (BPI).

NORTH CAROLINA: MITCHELL CO.: on twigs, Roan Mountain, June 15, 1936, *Schallert 11355* (B). MC DOWELL CO.: Mt. Mitchell, June 15, 1929, *Youngken* (BPI). AVERY CO.: on twigs of trees, elev. 5000 ft., Grandfather Mountain, June 16, 1923, *Schallert* (F).

WEST VIRGINIA: POCAHONTAS CO.: Greenbank, Spring 1929, *Gray 11126* (NYBG).



TENNESSEE: SEVIER CO.: deep wet woods, Clingmans Dome, elev. 6600 ft., Aug. 10, 1939, *Hubricht B1581* (MBG); woods, Newfound Gap, elev. 5500 ft., Aug. 25, 1937, *Hubricht B552* (MBG); cool wet deep forest, Clingmans Dome, Aug. 25, 1937, *Hubricht B567* (MBG).

#### SUMMARY

On the basis of a critical morphological study, four subgenera, fifty-six species, and ten varieties are recognized in North America, north of Mexico. Three new species have been described and two new combinations formed. Reducing Zopf's genus *Pseudevernia* to subgeneric rank a new subgenus was established to include those lichens placed in the subgenus *Euparmelia* section *Everniaeformes* by Zahlbruckner.

#### DOUBTFUL AND EXCLUDED SPECIES

*Parmelia ambigua* (Wulf.) Ach., Meth. Lich. 207. 1803 = *Parmeliopsis ambigua* (Wulf.) Nyl., Syn. Lich. 2: 54. 1860.

*Parmelia ambigua* var. *Halei* Tuck., Syn. N. Amer. Lich. 66. 1882 = *Parmeliopsis ambigua* var. *Halei* (Tuck.) Zahlbr., Cat. Lich. Univ. 6: 13. 1929.

*Parmelia arizonica* (Tuck.) Nyl., Lich. Jap. 104. 1890, should be in the family Gyrophoraceae.

*Parmelia atrofusca* (Schaer.) Crombie, Grevillea 7: 99. 1879, insufficient data.

*Parmelia colpodes* (Ach.) Nyl., Syn. Lich. 404. 1858 = *Anzia colpodes* (Ach.) Stizen., Flora 45: 243. 1862.

*Parmelia Frankliniana* Tayl., Hook. London Jour. Bot. 6: 167. 1847, insufficient data.

*Parmelia Halseyana* Tuck., Boston Jour. Nat. Hist. 3: 442. 1841, belongs in the genus *Lecanora*.

*Parmelia margaritata* Hue, Nouv. Arch. Mus. Paris IV. 1: 193. 1899, insufficient data.

*Parmelia stuppea* Tayl., Hook. London Jour. Bot. 6: 175. 1847, belongs in the genus *Lecanora*.

#### ACKNOWLEDGMENTS

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#### LIST OF EXSICCATAE, WITH ABBREVIATIONS USED

Bal.: Balansa, *Plantes du Paraguay*, 1888. 4176, 4210, 4234. Bartl.: Bartling & Hampe, *Vegetabilia Cellularia*, 1832-1845. Dec. IV 7, VIII 6. Bohl.: Bohler, *Lichenes Britannici or Specimens*, 1835-1837. 11, 110. Breut.: Breutel, *Flora Germanica Exsiccata*, 1832-1848. 402. Britz.: Britzelmayr, *Lichenes Exsiccati*, 1903-?. 523, 756. Claud.: Claudel & Harmand, *Lichenes Gallici praecipui Exsiccati*, 1903-1913. 15, 17, 19, 66, 117, 173, 258, 261, 506. Cromb.: Crombie, *Lichenes Britannici Exsiccati*, 1874. 26, 27, 30, 139, 141, 145. Cum.: Cummings, *Decades of North American Lichens*, 1892-1903. I 8, I 9 a-b, I 10, I 11, I 23, I 102, I 106, I 107, I 274, I 352; II 23, II 27, II 86, II 274. Cum. Lich. Bor. Am.: Cummings, Williams & Seymour, *Lichenes Boreali-Americani*, 1894-1903. 85, 165. Desm. ed. I. Ser. I: Desmazières, *Plantes Cryptogames du Nord de la France*, 1825-1851. 1940, 1942, 1943. Desm. ed. II. Ser. I and Ser. II: Desmazières, *Plantes Cryptogames de France*, 1836-1851. I 1590, I 1592, I 1593; II 586. Ekart.: Ekart, *Kryptogamische Gewächse Koburgs*. 8. Elenk.: Elenkin, *Lichenes Florae Rossiae*, 1904. 5, 52 a-c, 53 a-c, 54 a-c, 102 a, b, 106 a-b. Erb.: *Erbario Crittogamico Italiano*, 1858-1867. I 17, I 118, I 119, I 465, I 832, I 931, I 1221. Fellm.: Fellman, *Lichenes Arctici*, 1863. 77, 79, 80, 82, 83. Flag. Alg.: Flagey, *Lichenes Algerienses*, 1892. 11. Flag. Lich. Fr.-C.: Flagey, *Lichens de Franche-Comté*, 1882-1888. 16, 17, 72, 73. Flk.: Floerke, *Deutsche Lichenen*, 1815-1821. 34. Fl. Hung.: *Flora Hungarica Exsiccata*, 1913. 19. E. Fries: Fries, E., *Lichenes Sueciae Exsiccati*, 1818-1852. 48, 140, 166, 167, 168, 169, 260, 307, 335, 337. Th. Fries: Fries, Theodor M., *Lichenes Scandinaviae*, 1859-1865. 6. Funck: Funck, *Cryptogamische Gewächse des Fichtelgebirg's*, 1801-1838. I 11, I 141, I 374, I 661; II 107, II 108, II 109, II 113. Gar.: Garovaglio, *Lichenes Provinciae Comensis et Vallis-Tellinae*, 1837-49. I 8. Harm.: Harmand, *Lichenes Gallici Rariores Exsiccati*, 1909. 64, 66, 67, 69. Harm. Lich. Loth.: Harmand, *Lichenes in Lotharingia*. 258, 278, 288, 289, 294, 297, 313, 315, 319. Hav.: Havaas, *Lichenes Norvegiae Exsiccati*, 1901-1914. 78, 153, 179, 180, 181, 182, 222, 223, 251, 252, 314, 325, 390, 444. Hav. Occid.: Havaas, *Lichenes Norvegiae Occidentalis Exsiccati*, 1912-1913. 18. Hepp, Zür.: Hepp, *Flechten Zürich*. 41. Howe: Howe, *Lichenes Novae Angliae*, 1911-1914. 27, 28. Johns.: Johnson, *North of England Lichen-Herbarium*, 1894-1910. 23, 66, 67, 69, 221, 303. Larb. Caes.: Larbalestier, *Lichenes Caesarienses et Sargienses Exsiccati*, 1867-1869. 17, 64, 65, 66. Larb.



Herb.: Larbalestier, Lichen-Herbarium, 1879-1881. 86, 124, 211, 291, 293. Leight.: Leighton, Lichenes Britannici Exsiccati. 76, 203, 365. Lojk. Hung.: Lojka, Lichenes Regni Hungarici, 1884. 119. Lojk. Univ.: Lojka, Lichenotheca Universalis. 62, 63, 111, 158. Malbr.: Malbranche, Lichens de Normandie, 1863. 65, 225, 268, 269, 270, 315, 370. Malme: Malme, Lichenes Suecici Exsiccati, 1897-1916. 61, 66, 67, 133, 176, 178, 204, 230, 265, 405, 505. Mand.: Mandon, Lichens de Madère. 11. Mass.: Massalongo, Lichenes Italici Exsiccati, 1855-1856. 314. Meresch.: Mereschkowsky, Lichenes Rossiae Exsiccati. 4, 54, 55. Merr.: Merrill, Lichenes Exsiccati, 1909-1912. 27, 35, 75, 96, 221, 237, 251. Mig.: Migula, Cryptogamae Germaniae, Austriae et Helvetiae Exsiccatae, 1902-1904. 90. Moug. et Nest.: Mougeot et Nestler, Stirpes Cryptogamae Vogeso-Rhenanae. 249, 315, 353, 634, 1428. Mudd.: Mudd, Lichenes Britannici Exsiccati, 1861. 66. Mus. Krypt. Exs. Vind.: Kryptogamae Exsiccatae editae Museo Palatino Vindobonensi, 1894-1915. 156, 768, 876 a & b, 1046, 1365, 3163. Norrl. et Nyl.: Norrlin et Nylander, Herbarium Lichenum Fenniae. 26, 27, 202, 209, a, b. Nyl. Par.: Nylander, Herbarium Lichenum Parisiensium, 1855. 32. Nyl. Mont-Dor.: Nylander, Lichenes Mont-Dorienses, 1856. 29. Nyl. Pyr.: Nylander, Lichenes Pyrenaeorum Orientalium, 1872. 17, 54. Oliv.: Olivier, Herbar des Lichens de l'Orne et du Calvados, 1880-1884. 9, 116, 165, 208. Picq.: Picquenard, Lichens du Finistère. 74. Rab. Cent.: Rabenhorst, Kryptogamische Centurien. 7, 16, 22. Rab.: Rabenhorst, Lichenes Europaei Exsiccati, 1855-1879. 250, 471, 912. R. & S.: Reichenbach et Schubert, Lichenes Exsiccati, 1822-1824. 11, 35. Roum.: Roumeguère, Lichenes Gallici Exsiccati, 1879. 38, 40, 44, 186, 433, 558. Roum. Gen.: Roumeguère, Genera Lichenum Europaeorum Exsiccatae, 1895. 27. Salw.: Salwey, Lichenes Centum ex Herbario T. Salwey. 140, 144, 148, 168, 235, 237. Schaer.: Schaerer, Lichenes Helvetici Exsiccati, 1823-1852. 360, 365, 387. Schl.: Schliecher, Plantae Cryptogamicae Helvetiae Centuria. IV 46. Spruce: Spruce, Lichenes Amazonici et Andini, 1846. 127, 132, 136, 156, 176. Stenh.: Stenhammar, Lichenes Sueciae Exsiccati. 67, 71, 122, 123, 125, 154, 155, 156. Trev.: Trevisan, Lichenotheca Veneta, 1869. 156, 267. Tuck.: Tuckerman, Lichenes Americae Septentrionalis Exsiccati, 1854. 15, 17, 70, 72, 76, 78. Wain.: Wainio, Lichenes Brasilienses. 106, 400, 538b. Wartm.: Wartmann, Schenk & Winther, Schweizerische Kryptogamen, 1862-1882. 740, 741. Welw.: Welwitsch, Cryptotheca Lusitana, 1842-1850. 75, 77. West.: Westendorp, Herbar Cryptogamique Belge, 1845-1859. 1041. Zw.: Zwack-Holzhausen, Lichenes Exsiccati, 1850-1894. 252, 450, 569, 913.

### GENERAL INDEX

Accepted scientific names are in Roman type; synonyms, in *italics*; new names, new combinations and principal references in **bold face** type.

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